4158

ROYAL BOTANIC GARDENS, KEW

BULLETIN OF MISCELLANEOUS INFORMATION

1938

LONDON
PUBLISHED BY HIS MAJESTY'S STATIONERY OFFICE
To be purchased directly from H.M. STATIONERY OFFICE at the following addresses:
York House, Kingsway, London, W.C.2; 120 George Street, Edinburgh 2;
26 York Street, Manchester 1; 1 St. Andrew's Crescent, Cardiff;
80 Chichester Street, Belfast;
or through any bookseller.

1939

Price 12*s.* 6*d.* net

THE SEPARATE NUMBERS OF THIS VOLUME WERE PUBLISHED ON THE FOLLOWING DATES:—

	1938.	*Price.*
No. 1	February 19	1*s.* 3*d.* Net.
No. 2	March 23	9*d.* ,,
No. 3	April 26	1*s.* 0*d.* ,,
No. 4	May 23	9*d.* ,,
No. 5	June 23	1*s.* 0*d.* ,,
No. 6	August 15	1*s.* 0*d.* ,,
No. 7	October 7	1*s.* 0*d.* ,,
No. 8	November 10	9*d.* ,,
No. 9	December 1	1*s.* 1*d.* ,,
No. 10	December 31	1*s.* 6*d.* ,,

CONTENTS

No.	Article.	Subject.	Page.
1	I	Penstemon campanulatus and P. Kunthii	1
	II	Rain Forest in Ceylon	9
	III	A Preliminary List of Plant Diseases in Nigeria	17
	IV	Contributions to the Flora of Siam : XLVI	24
	V	New or Little-known Plants from Southern India : VIII	32
	VI	On the Occurrence of Fagus Orientalis in Greece	38
	VII	On the Synonymy and Distribution of Strychnos innocua Del.	45
	VIII	Miscellaneous Notes	52
2	IX	Euphorbia (Diacanthium) Deightonii, a new Succulent from West Africa, with brief notes on some Allied Species	53
	X	Contributions to the Flora of Tropical America : XXXIV	59
	XI	A Note on Certain Malayan Species of Sindora	73
	XII	The Botanical Name of the Douglas Fir	79
	XIII	Miscellaneous Notes	81
3	XIV	Notes on a Botanical Journey in S.W. Greenland, 1937	89
	XV	Contributions to the Flora of Siam : XLVII	98
	XVI	Notes on Carex : III	106
	XVII	Additions to the Flora of Borneo and other Malay Islands : VI	110
	XVIII	New or little-known Plants from Southern India : IX	123
	XIX	Contributions to the Flora of Siam : XLVIII	127
	XX	Miscellaneous Notes	133
4	XXI	The Formation of Intumescences containing Fatty Substances on the Stem of Khaya ivorensis	137
	XXII	African Orchids : X	141
	XXIII	Notes on Mesembryanthemeae : II	153
	XXIV	Meerburgh's Impatiens capensis	161
	XXV	Contributions to the Flora of Tropical America : XXXV	163
	XXVI	Miscellaneous Notes	169
5	XXVII	Additions to the Flora of Borneo and Other Malay Islands : VII	173
	XXVIII	Additions to the Flora of Borneo and Other Malay Islands : VIII	175
	XXIX	Notes on African Rubi in the Kew Herbarium	177
	XXX	A Synopsis of the Labiatae of the Guianas	187
	XXXI	Two New Species of Senecio from Argentina	197
	XXXII	Contributions to the Flora of Siam : XLIX	199

No.	Article.	Subject.	Page.
5	XXIII	Plants New to Assam : X	210
	XXXIV	Miscellaneous Notes	214
6	XXXV	Additions to the Flora of Borneo and Other Malay Islands : IX	221
	XXXVI	Notes on Carex : IV	242
	XXXVII	Researches on Silene maritima and S. vulgaris : XXI	248
	XXXVIII	Extra-Floral Nectaries on Osmanthus Leaves ...	254
	XXXIX	The Correct Name of the Common Parsley	256
	XL	Anatomy of Fraxinus oxycarpa and F. Pallisae	258
	XLI	A New Eugenia from Assam	262
	XLII	Miscellaneous Notes	264
7	XLIII	Alchemillae Novae	269
	XLIV	Additions to the Flora of Borneo and Other Malay Islands : X	275
	XLV	Three New Species from Tibet	285
	XLVI	Notes on Xylocarpus	288
	XLVII	Contributions to the Flora of Tropical America : XXXVI	292
	XLVIII	Contributions to the Flora of Burma : XIV	294
	XLIX	Neoporteria and Chilenia	296
	L	Four New Species of Vernonieae	298
	LI	Chileniopsis and Bridgesia	300
	LII	Miscellaneous Notes	301
8	LIII	A Revision of the Eucryphiaceae	317
	LIV	Miscellaneous Notes	350
9	LV	Contributions to the Flora of Tropical America : XXXVII	353
	LVI	Ecological Isolation	384
	LVII	Additions to the Wild Fauna and Flora of the Royal Botanic Gardens, Kew : XVIII	390
	LVIII	Miscellaneous Notes	396
10	LIX	The Siamese Verbenaceae	401
	LX	Contributions to the Flora of Siam : L.	445
	LXI	Binghamia, Haageocereus and Pseudoespostoa	454
	LXII	The Taxonomic Position of Tetrathalamus	458
	LXIII	On the Flora of the Nearer East : XIX	460
	LXIV	Pedilanthus versus Tithymalus	468
	LXV	Miscellaneous Notes	470
	Appendix	Review of the Work of the Royal Botanic Gardens, Kew, during 1938	473

S.O. Code No. 70-53-0-39

BULLETIN OF MISCELLANEOUS INFORMATION No. 1 1938
ROYAL BOTANIC GARDENS, KEW

I—PENSTEMON CAMPANULATUS AND P. KUNTHII.

T. A. Sprague and A. A. Bullock.

Considerable interest appears to have been taken in the cultivation of species of *Penstemon* towards the end of the eighteenth and the beginning of the nineteenth century, and numerous perplexing forms were figured and described in the horticultural literature of that period. The genus *Penstemon* Mitch. (1748) was not accepted by Linnaeus, who included under *Chelone* all the species of *Penstemon* known to him. The two genera are indeed closely related, the essential distinction lying in the seeds, which are winged in *Chelone* and wingless in *Penstemon*. Hence it is not surprising that many species of the latter genus were originally described under *Chelone*.

The first species of *Penstemon* introduced into cultivation in England* appear to have been *P. hirsutus* (L.) Willd. (*P. pubescens* Ait.) and *P. laevigatus*, Ait., both natives of Eastern North America. *P. Kunthii* G. Don was, as shown below, in cultivation at Kew in 1793. The Scientific Expedition of Nueva España [Mexico and Central America] led to the introduction of numerous new species from Mexico into cultivation in the Botanic Gardens, Madrid, and to their description by Cavanilles in his "Icones." Among these were *Chelone campanulata* Cav. Ic. **1,** 18, t.29 (1791), and *Ch. barbata* Cav. Ic. **3,** 22, t.242 (1794), both species now referred to *Penstemon*.

Cavanilles, in the preface to the first volume of his "Icones," mentions the receipt from Vicente Cervantes, José Longinos, and José Antonio Alzate, of seeds from Nova Hispania. Biographical details of these three botanists are given in Colmeiro, 'La Botanica y los Botanicos de la Península Hispano-Lusitana' (Madrid, 1858). The explorations of Humboldt and Bonpland† in Mexico made known four new species of *Penstemon*, all described under *Chelone*, namely, *Ch. imberbis* H.B.K., *Ch. gentianoides* H.B.K., *Ch. elegans*, H.B.K. and *Ch. angustifolia* H.B.K. Various

* Ait. Hort. Kew. ed. 1, **2**, 360 (1789).

† See Sprague, 'Humboldt and Bonpland's Mexican Itinerary' (Kew Bull, 1924, 20–27).

North American species of *Penstemon* discovered by Nuttall, Richardson and Bradbury were introduced into cultivation, and in 1830 eighteen species were enumerated (two of them under *Chelone*) by George Don* as cultivated in Britain. Eleven of these were from North America, while the following seven were stated to be natives of Mexico: *P. campanulatus, P. roseus, P. elegans, P. atropurpureus, P. Kunthii, Chelone gentianoides, Ch. barbata.*

From the evidence now available there seems little doubt that, even as early as 1798, some of the Penstemons grown in gardens had originated as horticultural hybrids. Fresh light has been thrown on this question by the examination of numerous plants, now identified as *P. campanulatus* and *P. Kunthii* respectively, grown by Lt.-Col. J. W. C. Kirk in his garden at Gedling House, Gedling, Notts. These were raised from seed collected near Mexico City by Mrs. W. H. Fellowes, and each species came up true to type. Being grown side by side, it was not surprising that seed collected from them produced a medley of intermediate forms, which had presumably originated by crossing. Specimens of the two original batches and of the intermediate forms were sent to Kew for identification and were originally determined, in accordance with Krautter's ' Comparative Study of the genus Penstemon ' †, as *P. campanulatus* (Cav.) Willd. In that work, *P. Kunthii* G. Don is treated as a synonym of *P. campanulatus*, doubtless on account of the existence of numerous intermediate forms, mainly in cultivation but also in the wild state. Krautter's view was accepted for two reasons: the herbarium material seemed to consist of an almost unbroken series, and the apparent correlation of vegetative with floral characters noted in the two cultivated plants received for identification was not borne out by examination of the dried specimens.

In September 1937, however, one of us was able to examine the living plants in full flower in Col. Kirk's garden, and agreed with him that a *prima facie* case existed for assigning the material to two species. The following summary of the contrasting characters was drawn up from an ample supply of fresh material sent specially by Col. Kirk.

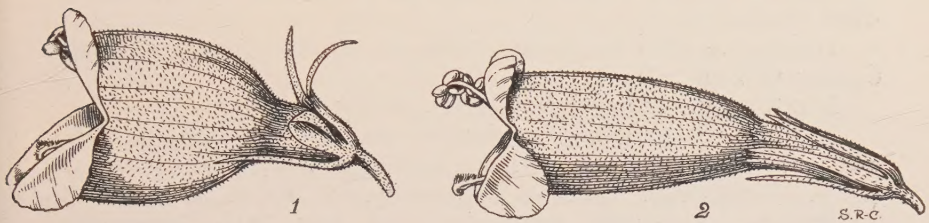
P. CAMPANULATUS.

Calyx-segments equalling or longer than the basal part of the corolla-tube, the three upper ones recurved-patulous. *Corolla* blue-purple, whitish below and inside, campanulate-funnel-shaped, constricted about 5 mm. above the markedly swollen base, 2·3–2·5 cm. long; upper lip at first straight in line with the corolla-tube, finally slightly recurved; stamens not exserted (fig. 1).

* Loudon's Hortus Britannicus, 243–4 (1830). As stated in the preface, the greater part of this work, namely, the Linnean Arrangement and its Supplement (pp. 1–490) were entirely the work of George Don, who should accordingly be cited as the authority for the new names published therein.

† Contrib. Bot. Lab. Univ. Pennsylv. **3,** No. 2 (1908).

Calyx-segments much shorter than the basal part of the corolla-tube, ascending. *Corolla* crimson-lake, paler inside, tubular-funnel-shaped, gradually narrowed above the slightly swollen base, narrowest about 7 mm. above the base, 2·8–3 cm. long ; upper lip at first straight in line with the corolla-tube, finally recurved at right angles ; stamens distinctly exserted (fig. 2).



1, Flower of *Penstemon campanulatus* ; 2, Flower of *P. Kunthii* : both × 2.

A revision of the numerous specimens in the Kew Herbarium identified as *P. campanulatus* (Cav.) Willd. and *P. pulchellus* Lindl. was undertaken in the light of these diagnoses, with the result that it has been possible to assign four-fifths of the material to one species or the other, the remaining sheets representing, chiefly, cultivated material. The synonymy and geographical distribution of the two species concerned appear to be as follows :—

K = Kew Herbarium ; BM = British Museum (Nat. Hist.) Specimens not specially marked are in the Kew Herbarium.

Penstemon campanulatus (*Cav.*) *Willd.* Sp. Pl. **3,** 228 (1800) ; Benth. Pl. Hartweg. 48 (1840) ; Hook. in Bot. Mag. t. 3884 (1841), excl. syn. nonnull. ; Benth. in DC. Prodr. **10,** 326 (1846), partim ; A. Gray in Proc. Amer. Acad. **6,** 74 (1862), partim ; Urbina, Cat. Pl. Mex. (Faneróg.) 257 (1897), partim ; Krautter in Contrib. Bot. Lab. Univ. Pennsylv. **3,** 147 (1908), partim.

Chelone campanulata Cav. Ic. Pl. **1**, t.29 (1791) ; H.B.K. Nov. Gen. et Sp. **2,** 364 (1818).

Penstemon pulchellus Lindl. in Bot. Reg. t.1138 (1828) ; Krautter, l.c.

Pentstemon Gentryi Standley in Publ. Field Mus. Nat. Hist., Chicago, **17,** 209 (1937).

CHIHUAHUA. S.W. Chihuahua, 1885, *Palmer* 307. Sierra Madre, near Colonia Garcia, 2250 m., July 1899, *Townsend and Barber* 106 (K)* ; near Casas Grandes, 2250 m., July 1899, *Townsend and Barber* 447 (K, BM). Sierra Canelas, Rio Mayo, Oct. 1935, *Scott Gentry* 1910.

* Another specimen of *Townsend and Barber* 106 (BM) is apparently a hybrid—(see p. 5).

DURANGO. Santiago Papasquiaro, 1896, *Palmer* 431. Otinapa, July–Aug. 1906, *Palmer* 429. Tejamén, Aug. 1906, *Palmer* 523, 524.

COAHUILA. Sierra de Parras, July 1910, *Purpus* 4584 (BM).

COAHUILA OR NUEVO LEON. Lerios, E. of Saltillo, 3000 m., 1880, *Palmer* 976.

SAN LUIS POTOSI. "Chiefly in the region of San Luis Potosi, 1800–2400 m.," *Parry and Palmer* 669.

GUANAJUATO. Near Santa Rosa de la Sierra, 2300 m., *Bonpland* 4266 (Herb. Berol.).

HIDALGO. Real del Monte, 2400 m., *Galeotti* 1051. Zimapan, *Coulter* 1277 (K : Herb. Hook., BM).*

MICHOACAN. Morelia, Nov. 1909, *Arsène* 619.

MEXICO. Anganguio, in pine forests, *Hartweg* 358 (K, BM). Valley of Mexico, in woods near Santa Fé, *Schaffner*. Contreras (D. F.), *Orcutt* 3499. Crucero, Temascaltepec, 2880 m., *Hinton* 2113.

PUEBLA. Esperanza, mountain slopes, Aug. 1907, *Purpus* 2694 (BM) ; Esperanza, Sept. 1911, *Purpus* 5676 (BM).

VERA CRUZ. Xalapa, without collector's name (? *Schiede*).

OAXACA. Without locality, 1842, *Ghiesbreght*.

Also collected in Mexico, without indication of State, by *Tate* 27 ; and "in hochgelegenen Gegenden, 1856", *Schweitz* 429 (BM). Two specimens from Mexico, Herb. Pavon (BM), inscribed "Chelone penstemon N[ueva] E[spaña]" and "Chelone campanulata Cav. de Mexico" respectively are also referable to *P. campanulatus*. Another specimen of *P. campanulatus* from Mexico (BM), labelled "Cleome [sic] campanulata N[ueva] E[spaña]" probably comes also from Herb. Pavon judging by the handwriting.

P. campanulatus is represented also by one of two specimens in Herb. Nuttall (BM) labelled "Pent. atropurpureum Mexico." The second specimen is *P. Kunthii*.

Penstemon Kunthii *G. Don*, Gen. Syst. **4,** 639 (1838).

Chelone angustifolia H.B.K. Nov. Gen. et Sp. **2,** 365, t.173 (1818).

Penstemon angustifolium (H.B.K.) Poir. in Dict. Sc. Nat. **38,** 385 (1825) ; non Fraser ex Pursh, Fl. Am. Sept. **2,** 738 (1814).

DURANGO. Durango, 1896, *Palmer* 825, 851 ; Tejamén, Aug. 1906, *Palmer* 521.

JALISCO. Real Alto, 2500 m., Jan. 1927, *Mexia* 1582 (BM).—Colour of flower stated to be maroon, but the specimen seen is in fruit, and therefore cannot be identified with certainty. It may be a hybrid.

HIDALGO. Moran, 2400 m., *Bonpland* 4110 (typus in Herb. Berol.). Real del Monte, *Ehrenberg* s.n. (ex Mus. Bot. Berol.) ; *ibid.*, 2400 m., 1840, *Galeotti* 1052 ; *ibid.*, *Coulter* 1277 (Herb. Hook.) ;

* A further specimen of *Coulter* 1277 from Zimapan (BM), represents *P. Kunthii*. A specimen of *Coulter* 1277 (Herb. Hook.), from Real del Monte and an unlocalized one of Coulter 1277 (Herb. Benth.), also represent *P. Kunthii*.

ibid., *Berlandier* 518 (BM). Zimapan, *Coulter* 1277 (BM)*. Without locality, *Coulter* 1277 (Herb. Benth.).

MEXICO. Tlalpuxahua, July 1828, *Graham*, 287 (K, BM), 288, 289. Pédrégal, *Bourgeau* 341. "Vallée de Mexico," *Bourgeau* 342. Flor de Maria, on calcareous bluffs, Aug. 1890, *Pringle* 3232 (K, BM). District of Temascaltepec: Socabon, Jan. 1932, *Hinton* 148; Los Hornos, Feb. 1932, *Hinton* 268; El Crucero, 2830 m., "two metres high, by the side of the road in the pine forest," June 1932, *Hinton* 872; Rincón, 1960 m., on a cliff, Oct. 1932, *Hinton* 2130; Ocotepec, ± 1500 m., Dec. 1932, *Hinton* 2902; Cajones, 2400 m., *Hinton* 5061. Without locality, *Parkinson* s.n., *Berlandier* 593 (BM).

MORELOS. Cuernavaca, Aug. 1854, *Schaffner* s.n. (Herb. Hook.).

PUEBLA. Acajete, Sept. 1910, *Orcutt* 3942.

OAXACA. Oaxaca, *Andrieux* 172.

A specimen from Hort. Kew. 1793 (BM) also belongs to *P. Kunthii*.

We have been unable to assign certain wild Mexican specimens either to *P. campanulatus* or to *P. Kunthii*. Pringle's no. 777, collected on mountains near Chihuahua in September-October 1886, and distributed as *P. pulchellus* Lindl., differs from typical *P. campanulatus* in the smaller calyx. The corollas vary in shape, and the stamens are subexserted in some of the flowers and included in others. It is suggested that the gathering under this number was made from a hybrid population. The Kew specimen of *Townsend and Barber* 106 is *P. campanulatus*, but the British Museum specimen of that number is apparently a hybrid. It has the exserted stamens of *P. Kunthii*, but is nearer *P. campanulatus* in the shape of the corolla, while the calyx is intermediate in character.

A specimen collected by *Coulter* at Zimapan, Hidalgo, under his number 1273 is of even greater interest. The large calyx and the shape and small size of the corolla suggest *P. campanulatus*, but the exsertion of the stamens agrees with *P. Kunthii*. Since Coulter collected both *P. campanulatus* and *P. Kunthii* at Zimapan under his no. 1277, apparently failing to distinguish them, the existence of a hybrid population at Zimapan seems indicated.

Various names which have cited as synonyms of *P. campanulatus* by Krautter and other authors now remain to be dealt with. These are *Chelone campanuloides* Andr., *Ch. elegans* H.B.K., *Ch. atropurpurea* Sweet and *Ch. rosea* Sweet.

The name *Chelone campanuloides* Andr. Bot. Rep. **1**, text of t.40 (Dec. 1, 1798) is clearly an orthographic or typographic error for *Ch. campanulata*. The latter name occurs on the plate, and Andrews states that the species was described and engraved by Cavanilles in his first volume of Spanish plants. He mentions that it was introduced along with *Ch. ruellioides* Andr.† (t.34, Oct. 1, 1798)

---

* Other specimens of *Coulter* 1277, from Zimapan, belong to *P. campanulatus*, q.v.

† Now treated as a synonym of *Penstemon barbatus* (Cav.) Nutt.

to the Royal Gardens at Kew in the year 1793, by Mr. Boutelow, the son of the gardener to the King of Spain, who was then in England pursuing his botanical studies. According to Aiton (Hort. Kew, ed. 2, **4**, 7, 8 : 1812) *Chelone barbata* Cav. (*Ch. ruellioides*) and *Penstemon campanulatus* were introduced in 1794 by Sir Joseph Banks. Comparison of Andrew's plate of *Ch. campanulata* with that of Cavanilles and with living material and herbarium specimens reveals important discrepancies in the calyx and corolla. The most probable explanation of these discrepancies is that the plant figured by Andrews was a hybrid.

We know that *P. Kunthii* was cultivated at Kew in 1793 under the name *Chelone campanulata*. It had presumably been introduced via Madrid, where the true *P. campanulatus* flowered in December in the Royal Garden, according to Cavanilles. As the preface to the first volume of his " Icones " is dated " Calendis Januarii anni 1791 " it is obvious that *P. campanulatus* must have first flowered at Madrid not later than December 1789. Presumably *P. Kunthii* was also in cultivation at Madrid, since the 1793 Kew " Chelone campanulata " (*P. Kunthii*) was stated by Andrews in 1798 to have been introduced by the son of the gardener to the King of Spain. *P. campanulatus* and *P. Kunthii* were not distinguished in gardens until the latter was described, as *Chelone angustifolia*, in 1818, and if, as seems probable, they were cultivated side by side in various countries of Europe, the early occurrence of putative hybrids between them, otherwise so perplexing, is at once explained.

Chelone elegans H.B.K. Nov. Gen. et Sp. **2**, 364 (1818) was based on specimens of two plants, one stated to have been collected in Cuba, and the other in Mexico, between Toluca and Tianguillo. The Cuban record is very doubtful, since *Penstemon* is nowhere indigenous in the West Indies. The description is insufficient to identify the species, and no type-specimens are extant, either at Paris or Berlin. Kunth thought that *Ch. elegans* might be a variety of *Ch. campanulata*.

Chelone atropurpurea Sweet (Brit. Fl. Gard. **3**, t. 235 : Jan. 1828) seems to differ from *Penstemon campanulatus* and *P. Kunthii* in having dark purple flowers. It differs from the former in the narrower corolla, and from the latter in the relatively long calyx, with recurved patulous upper segments, the larger and more spreading limb of the corolla, and the included stamens. G. Don retained it as a distinct species, *Penstemon atropurpureus* (Sweet) G. Don, in Loud. Hort. Brit. ed. 1, 243 (1830). Sweet states that the drawing of *Chelone atropurpurea* was made in the summer of 1827 from specimens given to him by Messrs. Young, nurserymen, of Epsom, and that he had also received specimens of it from R. Barclay of Bury Hill. He had seen further specimens in the herbarium of A. B. Lambert, in whose garden at Boyton they had been raised from Mexican seeds.

P. atropurpureus is represented in the Kew Herbarium by three apparently contemporary cultivated specimens. One sheet (Herb. Hook.) is labelled " Penstemon atropurpureum Sweet br. fl. gard." A second sheet (Herb. Hook.) is written up in W. J. Hooker's handwriting " Pentstemon atropurpureum Sweet. Hort. Barcl." The third sheet (Herb. Benth.) was first written up by Bentham as " Penstemon atropurpureum Hort. Soc. Hort. Lond. 20-7-29 " and afterwards as " Penstemon campanulatus Nutt. ; Benth. in DC. Prod. 10. 326." All three sheets agree with Sweet's plate of *Chelone atropurpurea*, and may be regarded as well authenticated. The corollas are from 2·3 to 2·5 cm. in length, whereas those shown in the plate range from 2·8 to 3·3 cm., possibly owing to the slight enlargement of flowers often found in illustrations given in horticultural periodicals.

We have no hesitation in referring to *P. atropurpureus* three collections of wild plants from Mexico. Galeotti's no. 1044, from woods of the Cordillera of Oaxaca, 2100–2700 m., agrees with the plate, except that the flowers are described by Galeotti as " red." The leaves are almost exactly like those figured by Sweet. Hartweg's no. 361 (K, BM), from Sumate, near Real del Monte, Hidalgo, differs in having longer and narrower leaves, and corollas 3–3·5 cm. in length.

P. atropurpureus was collected by *Gadow* (BM) on El Nevado in the State of Jalisco. In his book ' Through Southern Mexico ' pp. 509, 510 (1908) he mentions having seen " dark red-purple pentstemons " above 11,000 ft. on that mountain.

The precise status of *Penstemon atropurpureus* will remain doubtful until further observations are made in the field. It is desirable that seed of it should be obtained with a view to genetic studies. The possibility that it may be a hybrid between *P. campanulatus* and *P. Kunthii* cannot entirely be excluded. Both species occur in Oaxaca, and both have been recorded from Real del Monte. On the other hand, it may prove to be a mere variety of *P. campanulatus*, with which it apparently has much more in common.

The name *Chelone rosea* Cerv. ex Sweet first appeared without a description in Sweet, Hort. Brit. 305 (1827). The plant was there stated to have been introduced from Mexico in 1825. A description and coloured plate were supplied in Sweet, Brit. Fl. Gard. **3,** t.230 (Dec. 1827). Judging from these, it may be a hybrid between *P. campanulatus* and *P. Kunthii*. The calyx-segments are intermediate in character, but rather nearer those of *P. Kunthii*. The corolla agrees in size with *P. campanulatus*, and in shape and colour with *P. Kunthii*. The stamens are not exserted, approaching *P. campanulatus* in this respect.

Several published plates remain to be considered. The figures given, under the name *Pentstemon campanulatus*, in Jacq. Hort. Schoenbr. 59, t.362 (1798→) and in Sims, Bot. Mag. t. 1878 (Jan. 1, 1827), seem to agree with *P. campanulatus* (Cav.) Willd., except

for the colour of the corolla, which is too red. The plant named *Pentstemon angustifolium* by Lindley in Bot. Reg. t. 1122 (Jan. 1, 1828) is obviously not that species. The stamens are distinctly exserted as in *P. Kunthii* (*angustifolius*), but the shape of the corolla is much nearer that of *P. campanulatus*, and the corolla is shown as rose-coloured, which agrees with neither species. The plant appears to have been a hybrid. The drawing was made from a plant which flowered in Mr. Tate's nursery in 1827.

The plate named *Pentstemon angustifolium* in Lodd. Bot. Cab. **15,** t. 1420 (1828) shows a plant with flowers resembling those of *P. Kunthii*, but with subincluded stamens and entire leaves. Loddiges stated that the plant was first raised by Mr. Barclay, who communicated it to them. The plate conveys the general impression of being a careless representation of *P. Kunthii*.

Similarly the plate issued by Loddiges, Bot. Cab. **15,** t. 1429 (1828), as *Pentstemon atropurpureum*, may possibly be a very bad representation of that species. The leaves are less serrate, and no indumentum is shown on stem, leaves or inflorescence. The corolla-lobes are very acute, and quite inconsistent with those of *P. atropurpureus*. These discrepancies may be due either to extremely bad drawing or to the plant drawn being of hybrid origin.

SUMMARY.

1. *Penstemon campanulatus* and *P. Kunthii*, which have been united by Krautter and other authors, are separated in this paper.
2. *P. pulchellus*, which Krautter and others treated as an independent species, is here reduced to *P. campanulatus*.
3. *P. atropurpureus*, which Krautter reduced to *P. campanulatus*, is here restored provisionally to specific rank. We have assigned to it wild specimens from Jalisco, Hidalgo and Oaxaca.
4. Evidence has been adduced suggesting the existence in a wild state in Mexico of mixed populations consisting of *P. campanulatus*, *P. Kunthii* and hybrids between them.
5. It is shown that *P. campanulatus* was in cultivation at Madrid by the year 1789 or earlier, and that *P. Kunthii* was cultivated at Kew in 1793. Both were grown under the name "*Chelone campanulata*." The Kew plant was introduced from Spain, where both species were presumably cultivated side by side as "forms" of *Ch. campanulata*.
6. The first putative hybrid between these two species was figured in Andr. Bot. Rep. t. 40 (1798). The following illustrations also represent what appear to be hybrids: *Chelone rosea* Cerv. in Sweet, Brit. Fl. Gard. **3,** t. 230 (1827); *Penstemon angustifolium* Lindl. Bot. Reg. t. 1122 (1828), non (H.B.K.) Poir.

II—RAIN-FOREST IN CEYLON. John R. Baker (Department of Zoology and Comparative Anatomy, Oxford).

The south-west part of Ceylon receives both monsoons and has no really dry season, though the rainfall rises to maxima twice a year. The natural vegetation at low and medium altitudes in this area is tropical rain-forest, but there have been extensive clearings for cultivation and for the most part only small patches of the original forest remain. One rather large patch has, however, survived. This is the Sinharaja Forest, which is the subject of the present paper. I have recently given a general description (2) of the geography, climate and natural history of this forest, but the botany was only briefly mentioned. Some photographs were, however, published, which might be of interest to readers of this paper.

Schimper (11) does no more than mention that rain-forest exists in south-west Ceylon and that plank-buttresses on the trees are very common. Campbell (4) says that little forest remains in this area, and that such as remains is not particularly luxuriant. Guenther (6) made several short visits to patches of rain-forest in the south-west of Ceylon, though not to the Sinharaja itself; and he has left an interesting account of what he saw. The forest is mentioned by name by Willis (13) and Charawanamuttu (5), and Lewis (9) records a number of plants as occurring in it.

The Sinharaja Forest is situated south of Ratnapura and about 12 miles away at its nearest point. It is about 26 miles long and has an area of some 90 square miles. It extends from less than 300 feet to 3,838 feet above sea-level. It presents the characteristic features of a virgin tropical rain-forest. A list of the fifty commonest species of higher plants, away from paths, streams and clearings, is given in the Appendix. The straightness of the stems of the trees is a striking feature almost everywhere. Branches are only given off towards the tops, and the vertical pillar-like stems give the impression of the interior of a cathedral, which has struck observers of rain-forest in other parts of the world. One may estimate the height of the forest as a whole at about 115 feet. One tree was chosen as representing the average, and this was measured trigonometrically. The highest leaves were found to be 119 feet above the ground. When the forest is viewed from a distance, however, huge giants may be seen towering above this: these are probably mostly *Doona congestiflora*, *Dipterocarpus hispidus* and *D. zeylanicus*. One may distinguish these giants from the ordinary large trees such as the one measured, and also from small trees such as *Agrostistachys longifolia*; but there are not regular canopies, one below another, such as have been described in other rain-forests. Many of the trees have plank-buttress roots, but very high buttresses are not abundant.

In order to find which are the most abundant of the larger trees, a square half-acre was marked off at a medium elevation (1900 feet), and every tree was counted whose stem had a circumference of four feet or more at four feet above the ground. There were 25 such trees, namely the following :—eight specimens of *Durio zeylanicus* ; two specimens of each of the following :—*Myristica dactyloides*, *Calophyllum Calaba*, *Doona congestiflora*, *Palaquium grande*, and " Alaheraliya " ; one specimen of each of the following :—*Calophyllum Soulattri*, *Mesua Thwaitesii*, *Mangifera zeylanica*, *Semecarpus subpeltata*, *Anisophyllea cinnamomoides*, *Diospyros quaesita*, and " Yakahalu." The *Guttiferae* and *Dipterocarpaceae* are the families with the greatest number of common species in the forest, though in the area in which the count was made only one large Dipterocarp was present. The helicopter-like fruits usual in this family would only be able to serve their purpose in distribution in a species which projects above the general level of a forest. *Durio zeylanicus*, with its great prickly durian-like, but inedible fruit, is abundant everywhere. *Diospyros quaesita*, the calamander, is common ; but the beautifully figured and valuable heart-wood is only present in a small proportion of specimens.

In general, the various species of trees are mixed up together, but occasionally one species predominates almost to the exclusion of others. Thus there is a large group of *Mesua Thwaitesii* near the river Elewalaganga, south of the village of Pitakele. This species, common everywhere, is the local iron-wood.

Woody lianas (*Dalbergia* sp., *Chilocarpus* sp., *Calamus* spp. and others) are common, but not so common as in some rain-forests ; indeed, there is a certain restraint about the vegetation, contrasting with the wild luxuriance of, for instance, that of the northern New Hebrides. When the wind blows hard above the forest and sways the tree-tops, it is curious to see the lianas moving about near the ground among the immobile bases of the trees. There is no profusion of epiphytic growth on the stems of the trees, at any rate near the ground, and only a moderate growth of creepers (chiefly " Panampeti," *Freycinetia*, and *Pothos scandens*, the latter being remarkable for its flattened petioles).

The undergrowth is scanty, so that with two men going ahead with large knives one may proceed in any direction at about one mile per hour, unless prevented by the steepness of the ground. The poverty of the undergrowth is no doubt mostly due to the density of the leaf-canopy above ; though soil conditions may play a part. Kurz (8) says of the tropical rain-forest of Burma that shrubby vegetation " often disappears entirely in the depth of the dark interior." In the Sinharaja the undergrowth is to an extraordinary extent simply a nursery for the trees, but the young specimens are not present in the same proportions as their elders. Young trees of *Dipterocarpus zeylanicus* are particularly abundant, together with *Mesua Thwaitesii*, *Durio zeylanicus*, and the thatching-

leaf tree, *Agrostistachys longifolia*. The young trees are as lacking in lateral growth as their elders. A typical young *Dipterocarpus zeylanicus* was carefully measured, to serve as an example. The stem was unbranched and 10 feet 11 inches high. There were only nine leaves, and these were all large and were borne on the uppermost six inches of the stem. The stem was only one inch in diameter at the ground and $\frac{9}{16}$ inch at four feet. Such curiously-shaped young trees intensify the vertical effect of the whole forest. Many of the young trees produce new leaves which are red and droop vertically downwards. These are adaptations to avoid the ill-effects of brilliant illumination on growing tissues, and are no doubt useful when new leaves are being formed at the tops of the big trees ; but in the gloom below the canopy the character must be useless. I did not notice red or drooping young leaves on any forest plant except on those species whose subsequent growth would bring them into brilliant illumination. The young leaflets of the rattans (*Calamus*), which are also reddish, stick vertically upwards instead of drooping.

The really common undergrowth plants, other than young trees, are very few. Young rattans, before the growth of any stem, are abundant. The commonest plants which live all their life in the undergrowth are the ferns *Polystichum carvifolium* and *Cyathea sinuata* ; the wild cardamom (*Elettaria Cardamomum*) and another Zingiberaceous plant called " Wal-niya " ; and the bush *Apama siliquosa*. The latter is the only common bush of the forest, for this species departs from the general character of nearly all the plants in presenting a much-branched stem. The ground was largely covered at the time of my visit with the big leaves of *Dipterocarpus zeylanicus*, which had fallen some months before. Fallen timber is quite extraordinarily abundant, and impedes passage through the forest more than the undergrowth does. Polyporeae grow on the fallen timber, but I never saw a toadstool (Agaricineae) except in one situation : nearly every patch of elephant's dung has one or more, always apparently of the same species.

Fig. 1 illustrates the forest which I have described. It is very difficult to take a photograph which will give an accurate impression of a rain-forest. If one searches the literature, one finds that nearly all the photographs are of the edge of the forest, where it abuts on a river or clearing, or at least where a stream or path passes through it. If one studies such a place, one finds that the vegetation is almost completely different from that of the forest as a whole, owing to the much greater illumination. The photographs therefore represent only a minute fraction of the whole. I have tried to avoid this by placing my camera in the untouched forest, away from any path, stream or clearing. The difficulties of photography under such conditions are very great and technically good results cannot be obtained, but the object is to some extent represented.

The description I have given applies particularly to a medium elevation, namely about 1700–2000 feet. At lower elevations there

is no striking difference, but the following trees become noticeably commoner below 1000 feet :—*Trichadenia zeylanica, Homalium zeylanicum, Dipterocarpus zeylanicus* and *Vateria acuminata*. There is perhaps a slightly greater development of buttress-roots and lianas. At high elevations, e.g., at the summit of Wanduragala (3028 feet) and at 3400 feet on Rupahinkanda, the differences are more marked. The trees are smaller and more branched. *Wormia triquetra, Calophyllum Calaba* and species of *Eugenia* become abundant, and the fallen leaves of the first-named replace those of *Dipterocarpus zeylanicus*. *Doona congestiflora* remains abundant and is the largest tree at this elevation also. The less complete leaf-canopy gives more illumination beneath, and there is correspondingly more undergrowth. Bamboo forms an important part of it in places, and young specimens of *Agrostistachys* no longer abound. Dicotyledonous lianas do not occur, at any rate in any considerable numbers, though both thick and thin rattans persist and help to give a tropical impression.

According to the natives, the characteristically deciduous trees of the forest are *Dipterocarpus zeylanicus, D. hispidus, Doona nervosa, Stemonoporus Wightii*, and *Canarium zeylanicum*. During February or thereabouts these are commonly without leaves. February is the month in which the rainfall tends to be at a minimum. It will be noticed that four of the five deciduous trees mentioned above are Dipterocarps. In this there is agreement with the tropical rain-forest of Burma, of which Kurz (8) says, " The lofty trees towering above the dense forest mass are chiefly leaf-shedders " ; and he instances several Dipterocarps. Since none of the deciduous trees is particularly abundant in the Sinharaja, the forest is evergreen ; and indeed it would be a very extraordinary thing if it were not so, in such a remarkably unvarying climate. The trees of the forest as a whole are said by the natives to shoot forth their young leaves (often reddish) mostly about February and March. Flowering is said to be seasonal, most of the trees producing flowers about May–June, particularly about the time of the " wesak " full moon (May). The natives deny that any of the kinds of forest trees produces flowers and fruits throughout the year. *Doona nervosa* is said to flower and fruit only once in seven years, all individuals at the same time : the last occasion was about 1932. The fruits of most of the trees are said to ripen about the time of the harvesting of the " yala " rice-crop (August–September). This was borne out by myself, for during August I saw fruits of the following species on the trees or freshly dropped to the ground :—*Trichadenia zeylanica, Wormia triquetra, Dillenia retusa, Garcinia echinocarpa, Dipterocarpus zeylanicus, Doona congestiflora, Vateria acuminata, Elaeocarpus subvillosus, Durio zeylanicus, Kokoona zeylanica, Palaquium grande*, and " Alaheraliya."

I collected wood specimens of some of the trees for the study of growth rings, and my brother, Mr. S. J. Baker, has kindly prepared

Fig. 1. The Interior of the Sinharaja Forest, near Hapugoda.

[*To face page* 12

these for examination. In one species, *Anisophyllea cinnamomoides*, the medullary rays are so well developed as to obscure the concentric rings. In my specimens of *Mesua Thwaitesii* definite rings are not visible, and they are not well marked in *Dipterocarpus zeylanicus*. This is perhaps rather remarkable in a deciduous species. They are rather better developed in *Myristica dactyloides* and (?) *Vitex altissima*. In the other species studied (*Garcinia echinocarpa*, *Doona nervosa*, *D. congestiflora*, *Durio zeylanicus*, *Semecarpus subpeltata* and "Alaheraliya") they are as distinct as in ordinary Dicotyledonous trees of temperate regions, despite the small seasonal changes in climate. There is no certainty, however, that the rings are annual. In both species of *Doona* and also in "Alaheraliya" there is a tendency for the dark rings to be approximated in pairs. Since there are two hot wet periods in the year, alternating with two slightly cooler and noticeably less wet ones, it is tempting to suppose that a pair of dark rings is formed annually. *Durio zeylanicus* has the sharpest dark rings, and in this species they are curiously arranged. Many of the dark rings seen in transverse section spread out on one side of the stem in such a way as to enclose a crescentic region of paler wood. This shows that rapid growth of wood has occurred on one side of the stem at a time when it was not occurring on the other side.

Seasonal phenomena in the cultivated plants of the neighbourhood of the Sinharaja may be considered next. Breadfruit is plentiful in July and August, and a little is available in May. The main season for this food is not at the corresponding period of the year in the New Hebrides, in the Southern Hemisphere. Yams (*Dioscorea fasciculata* or "kukul-ala") are only cultivated on a small scale, and are planted and dug at any time of year, without reference to the season. This is in marked contrast to the New Hebrides, where the utmost care is taken always to plant at a definite season (Baker and Baker, 3). Cuttings of the sweet potato are put in twice a year, after the sowing of rice, and the tuberous roots are dug four months later. Two crops of ordinary or swamp rice are grown annually, as is usual in Ceylon. The sowing of the "yala" crop is finished by the Sinhalese New Year on 12th April. Harvesting takes place in August and September. This agrees with the general Ceylon practice, as given by Macmillan (10). The "maha" crop is sown in October–November, three months later than elsewhere, and harvested in February–March. Hill-rice, which grows on the hillside without the necessity for terracing and irrigation, is planted about 13th March, i.e., 30 days before the Sinhalese New Year, and is harvested about the time of the yala crop of swamp-rice. The kitul-palm, *Caryota urens*, flowers at all seasons of the year. The areca palm (*Areca Catechu*), unlike the kitul, is strongly seasonal. In the least wet month, February, some of the leaves fall and the flowers appear. The fruits are small in August and fully ripe by October.

Other plants commonly cultivated in the neighbourhood are Hevea rubber, manioc, tea, coconut, taro, and kurakkan.

I now turn to by far the most striking phenomenon presented by the forest as a whole. This is the shape of the leaves. Nearly every plant has the tip of the leaf or leaflet drawn out into a point. The common Monocotyledons of the forest mostly have such very narrow leaves that further narrowing to a special tip is not easily recognized, but in the Dicotyledons it is most obvious. Of the 41 Dicotyledons that are the commonest in the forest (apart from the vicinity of streams and paths), no fewer than 37 have the tips drawn out, and these 37 belong to more than 20 families. The phenomenon is common to the trees, to the bush *Apama siliquosa*, and to the lianas and creepers. (There is no very common Dicotyledonous undergrowth-plant.) The only exceptions among the common plants are *Wormia triquetra*, *Dillenia retusa*, *Calophyllum Calaba* and *Kokoona zeylanica*. The leaves and leaflets of the Dicotyledons are represented in Fig. 2. It might be thought that I had specially chosen those with pointed tips, but this is emphatically not so. The figure simply shows the leaves of those species which I regard as the most abundant at middle elevations in the forest.

Pointed tips to leaves are characteristic of plants of wet regions, and especially of tropical rain-forests, but I doubt whether any rain-forest can show the phenomenon more markedly than the Sinharaja. Attention was called to the subject by Jungner (7), who was struck by the prevalence of drawn-out tips to leaves (" Stachelspitzen ") in the plants of the rain-forest of the Cameroon region of West Africa. He concluded that the function of the pointed tip was to hasten the run-off of water from the leaf, and thus help to prevent insects and lower plants from attacking them. He noticed that leaves whose points have been broken off are much parasitized. He remarked that those Cameroon species which are not provided with the " Stachelspitze " have usually some other means (*e.g.*, poisonous sap) of protecting their leaves from parasitism. Stahl (12) made an elaborate study of the subject in West Java. He used the term " Träufelspitze " to indicate his conviction that the purpose of the drawn-out tip is to facilitate the run-off of water from the upper surface of the leaf. He timed the period required for the drying of a wetted leaf before and after the cutting off of the point, and noted large differences. He considered that the rapid run-off of water presents three advantages in addition to that stressed by Jungner. He pointed out that less mechanical strain is put upon the plant if the leaves are not weighted down by water ; that the water is directed straight towards the roots, instead of being dispersed or evaporated ; and that transpiration is aided by the reduction of the humidity of the air in the neighbourhood of the leaves. In the Sinharaja one notices that when it rains, one is not much protected by the canopy above, although it appears so dense. No doubt the " Träufelspitzen " are the cause.

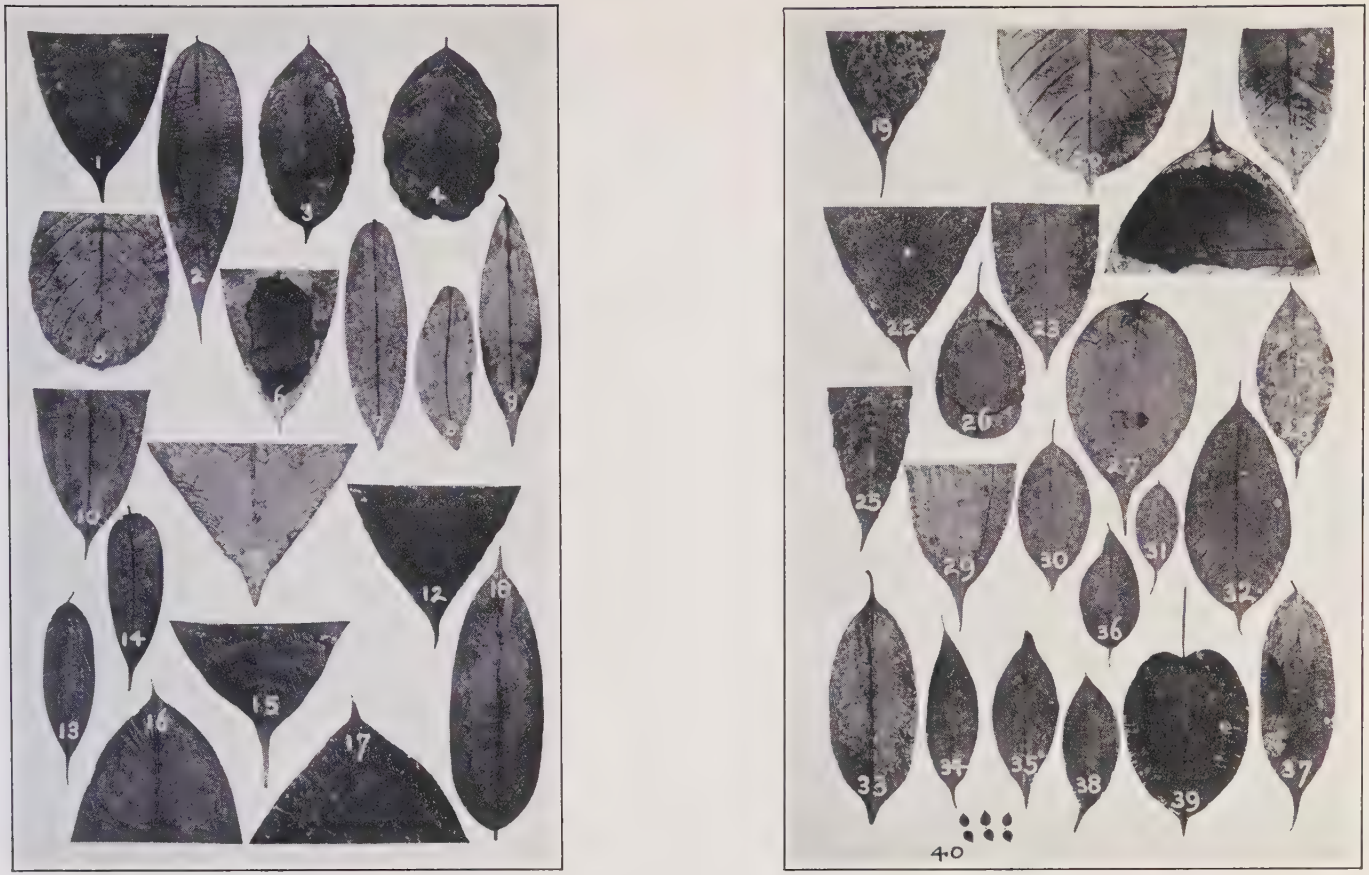


Fig. 2. The leaves and leaflets of the forty commonest Dicotyledons of the Sinharaja Forest, illustrating the prevalence of drip-points. The bases of the larger leaves have been omitted to save space. For names of the species see Appendix, p. 16.

[*To face page* 14

As is usual in tropical rain-forests, many of the trees have very large leaves (e.g., *Dipterocarpus hispidus*, *Vateria acuminata*, *Canarium zeylanicum*, and *Semecarpus subpeltata*).

I wish to thank Messrs. A. H. G. Alston, A. W. Exell, W. R. Philipson and T. B. Worthington for much help in the identification of the plants. The scientific names are mostly those used by Alston (1). Mr. A. B. Lushington and Mr. W. M. McNeill kindly gave me valuable advice.

Summary.

(1) The Sinharaja Forest, situated in the wet (south-west) part of Ceylon, is the only considerable area of virgin tropical rain-forest in the island. It covers about 90 square miles.

(2) It would appear that despite the relatively small climatic changes during the year, the flowering and fruiting is largely seasonal, and some of the largest trees are deciduous.

(3) Drip-points to leaves or leaflets are present in the great majority of the plants.

References.

1. Alston, A. H. G. Supplement to H. Trimen's *Handbook to the Flora of Ceylon*. Dulau, London (1931).
2. Baker, J. R. in *Geog. Journ.* **89**, 539 (1937).
3. Baker, J. R. & I. in *Journ. Linn. Soc. Zool.* **39**, 507 (1936).
4. Campbell, D. H. *An Outline of Plant Geography*. Macmillan, London (1926).
5. Charawanamuttu, V. E. *The New School Geography of Ceylon*. 2nd edit. Colombo (1930).
6. Guenther, K. *Einführung in die Tropenwelt*. Leipsig (1911).
7. Jungner, J. R. in *Bot. Centralbl.* **47**, 353 (1891).
8. Kurz, S. *Forest Flora of British Burma*. Calcutta (1877).
9. Lewis, F. *A Descriptive Catalogue of the more useful Trees and Flowering Plants of the Western and Sabaragamuwa Provinces of Ceylon*. Colombo (1902).
10. Macmillan, H. F. *Tropical planting and gardening*. Macmillan, London (1935).
11. Schimper, A. F. W. *Plant Geography upon a Physiological Basis*. Oxford (1903).
12. Stahl, E. in *Ann. Jard. Bot. Buitenz.* **11**, 98 (1893).
13. Willis, J. C. *Ceylon: a Handbook for the Resident and Traveller*. Colombo (1907).

Appendix.

List of the fifty flowering plants and ferns (excluding epiphytes) of the Sinharaja Forest, judged to be the commonest at medium altitudes, away from paths, streams and clearings. The numbers in the second column correspond with those in Fig. 2. The Sinhalese names are those used by the natives of the locality, who in some cases use a name for a plant differing from that used by the natives of other parts of Ceylon (e.g., Katamoda), and in other cases use the same name for a different plant (e.g., Na).

Family.	*No.*	*Species.*	*Local Sinhalese Name.*	*Habit.*
DICOTYLEDONS—				
Myristicaceae ...	1	*Myristica dactyloides* ...	Malaboda ...	Tree.
Aristolochiaceae	2	*Apama siliquosa*	Kepun-kiriya ...	Bush.
Flacourtiaceae ...	3	*Homalium zeylanicum* ...	Liyan	Tree.
Dilleniaceae ...	4	*Wormia triquetra*	Supara ...	Tree.
	5	*Dillenia retusa*	Godapara ...	Tree (small).
Guttiferae ...	6	*Garcinia echinocarpa* ...	Madol	Tree.
	7	*Calophyllum Soulattri* ...	Domba-kina ...	Tree.
	8	*Calophyllum Calaba* ...	Gutu-kina ...	Tree (small).
	9	*Calophyllum bracteatum* ...	Walu-kina ...	Tree.
	10	*Mesua Thwaitesii*	Na	Tree.
Dipterocarpaceae	11	*Dipterocarpus hispidus* ...	Buhora ...	Tree (very large).
	12	*Dipterocarpus zeylanicus* ...	Hora	Tree (very large).
	13	*Doona nervosa*	Hin-beraliya ...	Tree (very large).
	14	*Doona congestiflora*	Tinniya ...	Tree (very large).
	15	*Vateria acuminata*	Hal	Tree (very large).
	16	*Stemonoporus Wightii* ...	Maha-beraliya	Tree.
Tiliaceae	17	*Elaeocarpus subvillosus* ...	Gal-weralu ...	Tree (small).
Malvaceae ...	18	*Durio zeylanicus*	Katamoda ...	Tree.
Sterculiaceae ...	19	*Sterculia Balanghas* ...	Nava	Tree (small).
Euphorbiaceae ...	20	*Agrostistachys longifolia* ...	Beru	Tree (small).
	21	*Agrostistachys coriacea* ...	Hin-beru ...	Tree (small).
Burseraceae ...	22	*Canarium zeylanicum* ...	Dik-kekuna ...	Tree (very large).
Anacardiaceae ...	23	*Mangifera zeylanica* ...	Etamba ...	Tree.
	24	*Semecarpus subpeltata* ...	Maha-badulla	Tree.
Sapindaceae ...	25	*Pometia eximia*	Na-imbul ...	Tree.
Celastraceae ...	26	*Kokoona zeylanica*	Kokun ...	Tree.
Leguminosae ...	27	*Dalbergia sp.* (?)	Bambara-wel ...	Woody liana.
Rhizophoraceae ...	28	*Carallia calycina*	Ubberiya ...	Tree (very large).
	29	*Anisophyllea cinnamomoides*	Welipiyenna ...	Tree.
Combretaceae ...	30	*Terminalia parviflora* ...	Hampalanda ...	Tree (small).
Myrtaceae ...	31	*Eugenia phyllyraeoides* ...	Pinibaru ...	Tree (small).
Sapotaceae ...	32	*Palaquium grande*	Kiri-himbiliya	Tree.
Ebenaceae ...	33	*Diospyros quaesita*	Kalumederiya	Tree.
Apocynaceae ...	34	*Chilocarpus sp.* (?)	Kiri-wel ...	Woody liana.
Verbenaceae ...	35	*Vitex altissima* (?)	Milla	Tree.
Unidentified ...	36	—	Alaheraliya ...	Tree.
	37	—	Yakahalu ...	Tree.
	38	—	Kirindi-wel ...	Woody liana.
	39	—	Panu-wel ...	Woody liana.
	40, 41.	—	Hin- & wal-panampeti.	Creepers.
MONOCOTYLEDONS—				
Pandanaceae ...	42	*Freycinetia pycnophylla* ...	Viya-keyiya ...	Creeper.
Palmaceae ...	43, 44, 45.	*Calamus* spp. ...	We-, kukulu- & thambutu-wel.	Lianas.
Araceae	46	*Pothos scandens*	—	Creeper.
Zingiberaceae ...	47	—	Wal-hiya ...	Undergrowth plant.
	48	*Elettaria Cardomomum* ...	—	Undergrowth plant.
FERNS—				
Filicaceae ...	49	*Polystichum carvifolium* ...	Wal-miyena ...	Undergrowth plant.
Cyatheaceae ...	50	*Cyathea sinuata*	—	Undergrowth plant.

III—A PRELIMINARY LIST OF PLANT DISEASES IN NIGERIA.

J. West (Department of Agriculture, Nigeria).

Two collections of fungi made by Mr. C. O. Farquharson in Southern Nigeria and one made by Dr. J. W. Scott Macfie in Northern Nigeria were published by Miss E. M. Wakefield in the Kew Bulletin (1, 2, 3). These collections included a number of parasitic fungi. Numerous records and descriptions of specific plant diseases have appeared in the Annual Reports and Annual Bulletins of this Department and in various scientific journals. A list of plant diseases occurring in Nigeria was prepared by Mr. T. Laycock in 1929, but was never published.

This preliminary list presents a summary of all the records which are now available. Consequently, it contains records made by several individuals. The position of Mycologist was first held by Mr. C. O. Farquharson from 1911 to 1917, when he was lost at sea. Mr. T. Laycock was Mycologist between 1919 and 1932, and Mr. G. H. Jones was second Mycologist from 1923 to 1929. Early in 1932, on the retirement of Mr. Laycock, the Mycological and Botanical Sections were amalgamated, and since then the problems of plant pathology and plant breeding have been undertaken by a unified Section.

The work of Mr. Farquharson is worthy of note. At a time when the Department was in its infancy and when facilities were extremely limited, he laid a sure foundation for plant pathology in Nigeria. His views and outlook on his work are well expressed in a letter of his which was published in the Kew Bulletin (4).

Wherever possible, the initials of the individual responsible have been added after each record included in this list. It will be obvious that many of the diseases must have been noted in the past, but since no records exist, the initials of the author and a comparatively late date have perforce to appear after them.

A certain number of records have been included in which the symptoms of leaf mosaic or yellow chlorosis suggest that they represent virus diseases. Where no investigation of them has as yet been undertaken, the presumed virus cause is entered with a query.

The majority of the identifications have either been made or have been confirmed by the staff of the Imperial Mycological Institute, Kew, for whose help full acknowledgment is due.

References.

1. Kew Bulletin, 1912, 141–144.
2. *Ibid.* 1914, 253–261.
3. *Ibid.* 1917, 105–111.
4. *Ibid.* 1918, 353–361.

Acacia decurrens *Willd.* (Black Wattle).

Macrophomina phaseoli (Maubl.) Ashby. Root disease. Jos, 1927. T.L.

Ananas comosus (*Linn.*) *Merr.* (Pineapple).

Undetermined. Fruitlet brown rot. Agege, 1933. J.W.

Undetermined. Wilt. Agege, 1933. J.W.

Andropogon tectorum *Schumach.*

Uredo sp. Rust. Ibadan, 1935. J.W.

? *Ustilago amadelpha* Syd. & Butl. Smut. Ibadan, 1935. J.W.

Arachis hypogea *Linn.* (Groundnut).

Cercospora personata (Berk. & Curt.) Ell. & Ev. Leaf spot. Ibadan, 1913. C.O.F.

Corticium Solani (Prill. & Del.) Bourd. & Galz. Root disease. Ibadan. 1923. T.L.

Pestalozzia versicolor Speg. Leaf spot. Ibadan, 1932. J.W.

Sclerotium Rolfsii Sacc. Root disease. Ibadan, 1923. T.L.

Rosette. Virus. Ibadan, 1913. C.O.F.

Cajanus Cajan (*Linn.*) *Druce.* (Pigeon Pea).

Fomes lignosus Kl. White root disease. Colony, 1913. C.O.F.

Canavalia ensiformis *DC.* (Jack Bean).

Gibberella sp. Stem disease. 1922. T.L.

Sclerotium Rolfsii Sacc. Root disease. Ibadan, 1932. J.W.

Leaf Mosaic. ? Virus. Ibadan, 1934. J.W.

Capsicum annuum *Linn.* and **C. frutescens** *Linn.* (Chillies).

Colletotrichum Capsici (Syd.) Butl. & Bisby. Fruit rot. Ibadan, 1933. J.W.

Leaf Mosaic; mild and acute forms. ? Virus. Ibadan, 1935. J.W.

Carica Papaya *Linn.* (Pawpaw).

Phyllosticta Caricae-papayae Allesch. Leaf spot. Ibadan, 1933. J.W.

Citrus spp.

Botryodiplodia Theobromae Pat. Branch cankers, following injury due to *Sahlbergella* sp. On *C. paradisi* Macf. (grapefruit). Agege, 1935. J.W.

Elsinoë Fawcetti Bit. & Jenkins. Scab disease. On *C. paradisi*, *C. Aurantium* L. (sour orange), *C. Limon* Burm. f. (lemon). Ibadan, 1934. J.W.

Fomes noxius Corner. Brown root disease. On root stocks of *C. paradisi* Macf. var. (hybrid lemon), *C. aurantiifolia* (Christen.) Swingle (lime) and *C. Aurantium*. Agege, 1934. J.W.

Macrophomina Phaseoli (Maubl.) Ashby. Root disease. On stocks of *C. Limon*. Ibadan, 1935. J.W.

Penicillium sp. Green mould of fruits. On *C. paradisi*. Ibadan, 1935. J.W.

Phytophthora sp. Gummosis. On root stocks of *C. aurantifolia*. Ibadan, 1932. J.W.

Undetermined. Russet of fruits. On *C. paradisi*. Ibadan, 1936. J.W.

Undetermined. Silver scurf of fruits. On *C. paradisi*. Ibadan, 1937. J.W.

Clitoria sp.

Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1932. J.W.

Cocos nucifera *Linn.* (Coconut).

Undetermined. Bud rot. Awka, 1917. C.O.F.

Codiaeum sp. (Croton).

Cercospora Codiaei Cif. & Frag. Leaf spot. Ibadan, 1933. J.W.

Coffea spp. (Coffee).

Cercospora coffeicola Berk. & Curt. Leaf spot. On *C. arabica* Linn. Ibadan, 1933. J.W.

Colletotrichum coffeanum Noack. Berry and leaf disease. On *C. liberica*. Benin, 1931. T.L.

Fomes lignosus Kl. White root disease. On *C. liberica*. Agege, 1913. C.O.F.

Fomes noxius Corner. Brown root disease. On *C. arabica*. Ibadan, 1933. J.W.

Cola acuminata (*Beauv.*) *Schott. & Endl.* and **C. nitida** (*Vent.*) *Schott. & Endl.* (Kola).

Botryodiplodia Theobromae Pat. Rot of nuts. Ibadan, 1925. T.L.

Marasmius scandens Mass. Thread blight. Ajia, 1934. J.W.

Corchorus sp.

Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1935. J.W.

Crotalaria ? anagyroides *H.B. & K.*

Fomes noxius Corner. Brown root disease. Owena, 1937. J.W.

Cyperus sphacelatus *Rottb.*

Cintractia peribebuyensis Speg. Smut. Ibadan, 1935. J.W.

Uredo sp. Rust. Ibadan, 1935. J.W.

Dactyloctenium aegyptium (*Linn.*) *Beauv.*

Ustilago dactyloctaeniophila P. Henn. Smut. Ibadan, 1935. J.W.

Dahlia sp. (Dahlia).

Entyloma Dahliae Syd. Smut. Plateau Province, 1931. T.L.

Dioscorea spp. (Yams).

Anguillulina bradys (Steiner & LeHew) Goodey. Tuber disease. Ibadan, 1932, J.W.

Bagnisiopsis Dioscoreae Wakef. Witches' broom. Okigwi, 1917. C.O.F.

Phyllosticta Graffiana Sacc. Leaf spot. Ibadan, 1933. J.W.

Yellow Chlorosis. ? Virus. Oyo, 1935. J.W.

Dolichos Lablab *Linn.*

Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1933. J.W.

Elaeis guineensis *Jacq.* (Oil Palm).

Fomes lignosus Kl. White root disease. Agege. 1913. C.O.F.

Yellow Leaf. ? Physiological. Nkwele, 1933. J.W.

Infertile Bunch. ? Physiological. Benin, 1936. J.W.

Eugenia uniflora *Linn.* (Pitanga Cherry).

Marasmius scandens Mass. Thread blight. Ibadan, 1935. J.W.

Gossypium spp. (Cotton), including **G. peruvianum** *Cav.*, **G. vitifolium** *Lam.* and **G. hirsutum** *Linn.*

Alternaria macrospora Zimm. Leaf and boll disease. Ibadan, 1923. G.H.J.

Bacterium malvacearum (E. F. Sm.) E. F. Sm. Bacterial disease. Cotton districts, 1912. C.O.F.

Botryodiplodia Theobromae Pat. Boll rot. Cotton districts, 1912. C.O.F.

Cephalosporium sp. Boll rot. Ibadan, 1926. T.L.

Cercospora gossypina Cooke. Leaf spot. Ibadan, 1927. G.H.J.

Cerotelium desmium (Berk. & Br.) Arth. Rust. Colony, 1912. C.O.F.

Colletotrichum Gossypii South. Anthracnose. Cotton districts, 1912. C.O.F.

Fusarium sp. Boll rot. Ibadan, 1923. T.L.

Macrophomina Phaseoli (Maubl.) Ashby. Damping off. Ibadan, 1927. G.H.J.

Nematospora Gossypii Ashby & Nowell. Boll rot. Ibadan, 1923. T.L.

Ramularia areola Atk. Areolate mildew. Cotton districts, 1912. C.O.F.

Leaf Curl. Virus. Ibadan, 1912. C.O.F.

Crinkle. Physiological. Ibadan, 1924. C. H. Wright and T. G. Mason.

Leaf Roll. Physiological. Ibadan, 1923. G.J.J.

Hevea brasiliensis *Muell.-Arg.* (Rubber).

Botryodiplodia Theobromae Pat. Die back. Agege, 1912. C.O.F.

Ceratostomella (*Ophiostoma*) sp. Mouldy rot of tapped surface. Sapele, 1920. T.L.

Colletotrichum coffeanum Noack. Leaf spot. Ibadan, 1933. J.W.

Corticium salmonicolor Berk. & Br. Pink disease. Calabar, 1911.

Fomes lignosus Kl. White root disease. Sapele, 1912. C.O.F.

Fomes noxius Corner. Brown root disease. Agege, 1912. C.O.F.

Ganoderma pseudoferreum (Wakef.) van Overeem & Steinm. Wet rot. Sapele, 1920. T.L.

Marasmius scandens Mass. Thread blight. Sapele, 1920. T.L.

Phytophthora palmivora Butl. Canker. Sapele, 1920. T.L.

Phytophthora sp. Black stripe disease. Sapele, 1920. T.L.

Ustulina zonata Lév. Collar rot. Calabar, 1913. C.O.F.

Undetermined. Brown bast. Sapele, 1920. T.L.

Hibiscus esculentus *Linn.* (Okra).

Leaf Curl. Similar to that on cotton. Agbor, 1912. C.O.F.

Hippeastrum equestre (*Ait.*) *Herb.*
Leaf Mosaic. ? Virus. Ibadan, 1937. J.W.
Imperata cylindrica *Beauv.* (Spear Grass).
Sphacelotheca Schweinfurthiana (Thum.) Sacc. Smut. Ibadan, 1935. J.W.
Ipomoea sp.
Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1933. J.W.
Lawsonia inermis *Linn.* (Egyptian Privet).
Septobasidium sp. Twig disease. Vom, 1933. J.W.
Lycopersicum esculentum *Mill.* (Tomato).
Fusarium bulbigenum Cooke & Mass. var Lycopersici (Brushi) Wollenw. & Reink. Wilt. Buea, Cameroons, 1922. T.L.
Leaf Mosaic. ? Virus. Ibadan, 1934. J.W.
Mangifera indica *Linn.* (Mango).
Cercospora Mangiferae Koord. Leaf spot. Ibadan, 1933. J.W.
Manihot spp. (Cassava, Ceara Rubber).
Cercospora Henningsii Allesch. Leaf spot. On *M. utilissima* Pohl and *M. Glaziovii* Muell.-Arg. Ibadan, 1932. J.W.
Fomes lignosus Kl. White root disease. On *M. utilissima*. Agege, 1913. C.O.F.
Leaf Mosaic. Virus. On *M. utilissima*, *M. Glaziovii* and *Manihot* sp. Ijebu-Ode, 1926. G.H.J.
Mariscus umbellatus *Vahl.*
Cintractia limitata Clint. Smut. Ibadan, 1935. J.W.
Momordica sp.
Yellow Chlorosis. ? Virus. Ibadan, 1935. J.W.
Mucuna aterrima *Holland.* (Bengal Bean).
Cercospora Stizolobii Syd. Leaf spot. Ibadan, 1933. J.W.
Macrophomina Phaseoli (Maubl.) Ashby. Root disease. Ibadan, 1932. J.W.
Sclerotium Rolfsii Sacc. Root disease. Ibadan, 1932. J.W.
Leaf Mosaic. ? Virus. Ibadan, 1934. J.W.
Nicotiana Tabacum *Linn.* (Tobacco).
Cercospora Nicotianae Ell. & Ev. Leaf spot. Ilorin, 1924. G.H.J.
Heterodera marioni (Cornu) Goodey. Root knot. Oshogbo, 1935. J.W.
Leaf Curl. Virus. Meko, 1912. C.O.F.
Leaf Mosaic. ? Virus. Ilorin, 1924. G.H.J.
Panicum maximum *Jacq.*
Ustilago heterospora P. Henn. Smut. Ibadan, 1935. J.W.
Pennisetum typhoides *Stapf & Hubbard.* (Millet).
Sclerospora graminicola Schroet. Green ear disease. Makurdi, 1928. T.L.
Sphacelotheca cruenta (Kühn) Potter. Smut. Makurdi, 1928. G.H.J.
Sphacelotheca Sorghi (Link) Clint. Smut. Zaria, 1928. G.H.J.

Tolyposporium Penicillariae Bref. Smut. Northern Provinces, 1924. G.H.J.

Phaseolus lunatus *Linn.* (Lima Bean).

Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1932. J.W.

Macrophomina Phaseoli (Maubl.) Ashby. Root disease. Ibadan, 1932. J.W.

Sclerotium Rolfsii Sacc. Root disease. Ibadan, 1932. J.W.

Yellow Chlorosis. ? Virus. Ibadan, 1929. T.L.

Leaf Mosaic. ? Virus. Ibadan, 1932. J.W.

Ricinus communis *Linn.* (Castor).

Cercosporina ricinella (Sacc. & Berl) Speg. Leaf spot. Ibadan, 1933. J.W.

Rottboellia exaltata *Linn.* f.

Uredo Rottboelliae Diet. Rust. Ibadan, 1935. J.W.

Sesamum indicum *Linn.* (*Sesamum orientale* Linn.). (Beniseed).

Macrophomina Phaseoli (Maubl.) Ashby. Wilt. Makurdi, 1928. T.L.

Setaria longiseta *Beauv.*

Ustilago heterospora P. Henn. Smut. Ibadan, 1935. J.W.

Sida sp.

Puccinia heterospora Berk. & Curt. Rust. Ibadan, 1935. J.W.

Sida sp.

Leaf Curl. Similar to that on cotton. Ibadan, 1935. J.W.

Solanum tuberosum *Linn.* (Potato).

Bacterium solanacearum (E. F. Sm.) E. F. Sm. Wilt. Buea, Cameroons, 1923. T.L.

Sorghum vulgare *Pers.* (Guinea Corn).

Sorosporium Reilianum (Kühn) McAlp. Smut. Ilorin, 1929. T.L.

Sphacelotheca Sorghi (Link) Clint. Smut. Makurdi, 1928. G.H.J.

Tectona grandis *Linn.* (Teak).

Fomes lignosus Kl. White root disease. Mamu, 1915. C.O.F.

Fomes noxius Corner. Brown root disease. Mamu, 1915. C.O.F.

Ustulina zonata Lév. Collar rot. Mamu, 1915. C.O.F.

Tephrosia spp.

Fomes noxius Corner. Brown root disease. On *T. candida* DC. Mamu, 1935. J.W.

Heterodera marioni. (Cornu) Goodey. Root knot. On *T. candida*. Owena, 1937. J.W.

Yellow Chlorosis. ? Virus. On *T. candida* and *T. vogelii* Hook. Ibadan, 1935. J.W.

Theobroma Cacao *Linn.* (Cacao).

Aspergillus flavus Link, *A. Tamarii* Kita, *A. fumigatus* Fresen, and *A. Sydowi* Bain. & Sartory. Mouldiness in cacao beans. Ibadan, 1929. T.L.

Botryodiplodia Theobromae Pat. Brown pod and die back. Colony, 1912. C.O.F.

Cephaleuros mycoidea Karst. Algal disease. Benin, 1932. J.W.

Colletotrichum theobromicola Del. Pod anthracnose. Colony, 1912. C.O.F.

Fomes lignosus Kl. White root disease. Agege, 1912. C.O.F.

Fomes noxius Corner. Brown root disease. Colony, 1912. C.O.F.

Marasmius scandens Mass. Thread blight. Ajia, 1934. J.W.

Phytophthora palmivora Butl. Black pod and canker. Colony, 1912. C.O.F.

Undetermined. Stone pod. Victoria, Cameroons, 1921. T.L.

Urochloa lata (*Schum.*) *C. E. Hubbard.*

Uromyces leptodermus Syd. Rust. Ibadan, 1935. J.W.

Vernonia amygdalina *Delile.*

Leaf Curl. Similar to that on tobacco. Ogbomoshɔ, 1935. J.W.

Viġna unguiculata (*Linn.*) *Walp.* (Cowpea).

Heterodera marioni (Cornu) Goodey. Root knot. Ibadan, 1935. J.W.

Uromyces Vignae Barclay. Rust. Ibadan, 1934. J.W.

Leaf Mosaic. ? Virus. Ibadan, 1934. J.W.

Zea Mays *Linn.* (Maize).

Fusarium sp. Pink mould of tassels. Ibadan, 1933. J.W.

Helminthosporium turcicum Pass. Leaf blight. Ibadan, 1933. J.W.

Ophiobolus heterostrophus Drechs. Green mould of tassels. Ibadan, 1933. J.W.

Physoderma Zeae-maydis Shaw. Brown spot. Ibadan, 1933. J.W.

Ustilago Zeae (Beckm.) Ung. Smut. Ibadan, 1934. J.W.

Streak Disease. Virus. Ibadan, 1936. J.W. Determined by Dr. H. H. Storey, Amani.

Miscellaneous Records.

Cephaleuros mycoidea Karst. Commonly producing spots on leaves of *Citrus* spp., *Theobroma Cacao* Linn., *Cassia siamea* Lam., *Dalbergia Sissoo* Roxb., *Persea americana* Mill. and *Piper nigrum* Linn.

Thonningia sanguinea Vahl (Balanophora). Plant parasite on the roots of *Hevea brasiliensis* Muell.-Arg. Sapele, 1917. C.O.F. Also on forest trees.

Loranthus sp. Commonly parasitic on *Citrus* spp., *T. Cacao,* and ornamental plants.

IV—CONTRIBUTIONS TO THE FLORA OF SIAM. ADDITAMENTUM XLVI.*

Rhododendron taiense *Hutch.* [Ericaceae–Rhododendreae]; affine *R. Henryi* Hance, sed foliis angustioribus et longioribus, pedicellis longioribus, floribus albis differt.

Arbor circiter 10 m. alta; ramuli sicco purpureo-brunnei, glabri. *Folia* subverticillata, oblongo-oblanceolata, acute acuminata, basi acuta, 10–14 cm. longa, 3–3·5 cm. lata, glabra, nervis lateralibus utrinsecus circiter 10 utrinque prominulis; petioli 1·5 cm. longi, supra anguste sulcati; perulae breviter ciliatae, extra glabrae. *Inflorescentia* terminalis, circiter 4-flora, perulis mox deciduis; pedicelli 1·5 cm. longi, glanduloso-pilosi. *Calyx* brevis, undulatim lobatus, glaber. *Corolla* infundibuliformis, 4 cm. longa, glabra; lobi 5, oblongo-elliptici, 2 cm. longi. *Stamina* corolla leviter breviora; filamenta leviter pilosa; antherae 3 mm. longae. *Ovarium* glabrum, sicco sulcatum; stylus glaber, corollae aequilongus, stigmate magno discoideo.

Nakawn Sritamarat Prov.; Kao Luang, about 1400 m., in evergreen forest, Apr., *A. F. G. Kerr* 15512 (type).

The specific name refers to Tai, the Siamese name for Siam.

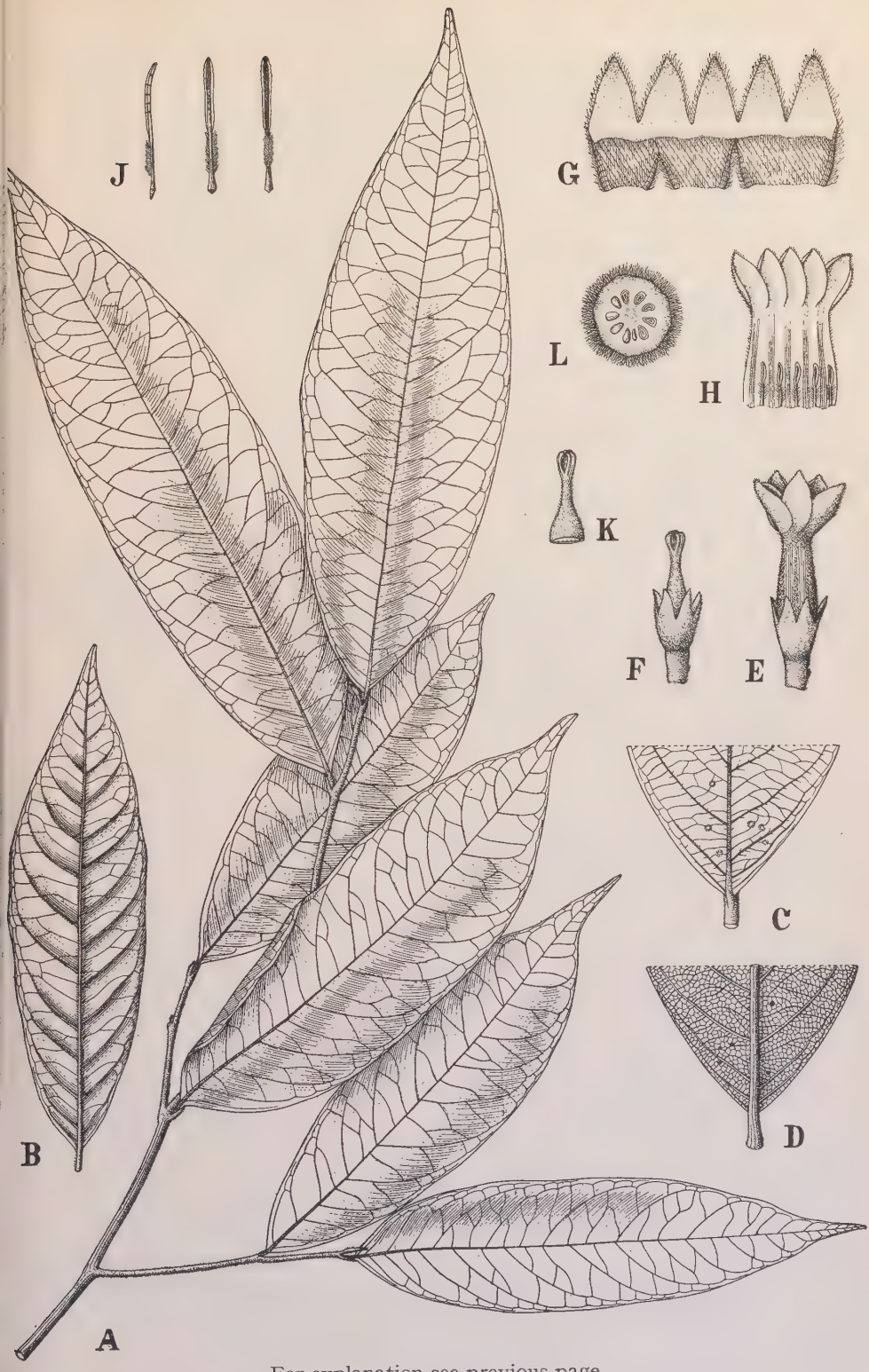
Diospyros Vanprukii *Bakh.* [Ebenaceae]; *D. apiculatae* Hiern affinis, sed ovario 10-loculari et corolla tomentella praecipue differt.

Frutex. Ramuli teretes, graciles, fulvo-tomentosi, deinde glabrescentes, rimosi, statu sicco albicantes et nigricantes, gemmis oblongis tomentosis. *Folia* alterna, bifaria, breviter petiolata, oblongo-lanceolata, 10–20 cm. longa, 4–6 cm. lata, basi obtuse cuneata vel obtusa, apice acuminata, subacuta, integerrima, margine reflexa, membranacea, statu sicco supra olivacea, subopaca, costa excepta glabrata vel glabra, subtus pallidiora, opaca, costa excepta glabrata vel glabra, basi glandulis parvis orbicularibus munita, penninervia; costa supra depressa, subtus prominens, utrinque fulvo-tomentosa, nervis lateralibus 10–17-paribus perspicuis supra depressis glabris vel glabratis, subtus valde prominentibus pilosis vel glabrescentibus adscendentibus secus marginem arcuatis non vel obscure anastomosantibus, venis laxis transverse parallelis utrinque prominulis; petiolus teres vel subteres, rugosus, rufo-tomentosus, glabrescens, 3–5 mm. longus. *Flores* dioici, parvi. *Flores masculi* adhuc ignoti. *Flores feminei* 5-meri, breviter pedicellati vel subsessiles; calyx campanulatus, basi angustatus, usque

*Continued from K.B. 1937, 510.

Explanation of Figure on opposite page.

Diospyros Vanprukii Bakh. A, Leaf branch (nat. size). B, Leaf, seen from below (nat. size). C, D, Leaf base (×2): C, seen from above and D, seen from below. E–L, Flower with details: E, Expanded flower seen from side (×4); F, Calyx and ovary (×4); G, Calyx opened, seen from inside (×10); H, Corolla with staminodes, slit lengthwise, seen from inside (×4); J, Staminodes (×20); the left one seen from side, the middle one seen from outside, the right one seen from inside; K, Ovary (×4); L, Ovary in transverse section. (*Vanpruk* 623, ♀, III–1915, Siam, Sin Pun, Krabi, type specimen in Herb. Kew.)



For explanation see previous page.

ad medium vel profundius 5-lobatus, utrinque sed praecipue extra appresse subdense pubescens, 3–4 mm. longus, lobis ovato-oblongis acutis ciliatis ; corolla hypocrateriformis, 5-lobata, extra tomentella, intus glabra, 1–1·3 cm. longa, tubo cylindrico apice angustato 6–8 mm. longo 2–2·5 mm. diam., lobis ovato- ellipticis obtuse acuminatis extra tomentellis intus glabris aestivatione sinistrorse imbricatis 4–5 mm. longis 2·5–3 mm. latis ; staminodia 4–5, basi corollae inserta, 2–2·5 mm. longa, filamentis parte exteriore pilosis, antheris lineari-lanceolatis glabris ; ovarium ovoideum, apicem versus in stylum angustatum, dense hispidum, 5–6 mm. longum, 10-loculare, loculis uniovulatis, stylo elongato dense tomentello apice 5-lobato 4–5 mm. longo, stigmatibus linearibus suberectis incurvis 1–2 mm. longis. *Fructus* ignotus.

Sin Pun, Krabi, alt. 150 m., March 1915, *Vanpruk* 623, fol. et flor., ♀.

When I was working up the *Ebenaceae* of the Malay regions, part of the rich materials of the Asiatic species of this family, treasured up in the Kew Herbarium, were sent to me for examination. Among them I met with the specimen *Vanpruk* 623, collected in Sin Pun, Siam, which seemed to belong to a new species. Notwithstanding the sparingly setulose base of the ovary, I think the species should be placed in my section *Basithrix* (see Bulletin du Jardin Botanique de Buitenzorg, Série 3, **15,** 27 : 1936). It seems intermediate between *D. apiculata* Hiern and *D. selangorensis* Bakh. From *D. apiculata* it may be distinguished at once by the hairy corolla. Noteworthy are also the one-sidedly hairy filaments.

Up to now only the female plant is known with certainty to me. Possibly in future the specimen *Vanpruk* 619 (Siam, Trang, March 1915, ♂) will be considered the male one. On account of the nearly glabrous corolla-lobes, I provisionally reduced this material in my revision to *Diospyros sumatrana* Miq. var. *flavescens* (Wall.) Bakh. forma *siamensis* Bakh. Only a closer examination of the Siamese species can decide whether these two specimens are conspecific or not. R. C. BAKHUIZEN VAN DEN BRINK.

Jasminum calcicolum *Kerr* [Oleaceae] ; a *J. didymo* Forst., cui affine, floribus multo majoribus, inflorescentia minore distinguitur.

Frutex scandens, inflorescentia excepta glaber, ramulis gracilibus teretibus, lenticellis ellipticis parce obsitis. *Folia* opposita, trifoliolata, petiolo 0·6–1·8 cm. longo suffulta ; foliola subaequalia, vel saepius lateralia paulo minora, ovata vel ovato-lanceolata, basi rotundata vel parum cordata, apice longe sensimque acuminata, acuta, margine interdum leviter corrugata, 4–7·5 cm. longa et 1·3–3·5 cm. lata, chartacea, supra vernicosa, subtus opaca, basi 3–5-nervia, nervis supra leviter impressis, subtus prominulis, fere apicem attingentibus ; petioluli medii 9–14 mm., laterales 5–11 mm. longi, dimidio superiore conspicue articulati. *Inflorescentia* lateralis vel terminalis, paniculata, 6–18-flora, minute puberula, ad 3 cm. longa et lata, pedunculo communi subnullo vel ad 1·6 cm.

longo, pedunculis secundariis 0·3–1·4 cm. longis. *Calyx* cupuliformis, minute puberulus, 2 mm. longus, breviter 5-dentatus, dentibus 0·5 mm. longis. *Corolla* alba, glabra ; tubus 12 mm. longus, superne parum ampliatus ; lobi 5, oblongo-lanceolati, subacuti, 10 mm. longi, 3·5 mm. lati. *Stamina* dimidio superiore tubi inserta, inclusa, antheris acute mucronatis, 3 mm. longis, filamentis 1 mm. longis. *Ovarium* 1 mm. altum, stylo 2·5 mm. longo, stigmate clavato 2 mm. longo. *Fructus* ut videtur simplex, ellipsoideus, 9 mm. longus, 5 mm. latus.

Lampang, Che Hom, c. 400 m., in deciduous forest on rocky limestone hill, *Kerr* 4789 (*type*). Menam Pasak, Keng Koi, in evergreen forest on limestone hill, *Kerr* 7968.

Jasminum carissoides *Kerr* [Oleaceae] ; affine *J. eleganti* (Hemsl.) Yam., foliis basi cordatis, haud cuneatis, foliorum nervis minus distinctis, inter alia, differt.

Frutex scandens ; ramuli patentes, angulo recto e ramo orientes, teretes, fistulosi, statu juvenili minute puberuli, mox glabrescentes. *Folia* simplicia, opposita, late ovata, vel fere triangularia, basi leviter cordata, apice rotundata, mucronulata, ad 2·8 cm. longa, 2·1 cm. lata, supra nitida, glabra, subtus opaca, secus nervos minute puberula, nervis basalibus 5 supra inconspicuis subtus subprominulis ; petiolus 1–1·5 mm. longus, puberulus. *Flores* solitarii, axillares vel terminales, subsessiles vel brevissime pedicellati, bracteis minutis, ovatis. *Calyx* minute puberulus ; tubus 1·5 mm. longus ; lobi 6, subulati, 4 mm. longi. *Corolla* alba, glabra ; tubus 20 mm. longus, superne leviter ampliatus ; lobi 8, ovato-oblongi, apice acuminati, acuti, 12 mm. longi, 5 mm. lati. *Stamina* apicem tubi versus inserta, inclusa, antheris 4·5 mm. longis mucronatis, filamentis 1 mm. longis. *Ovarium* 0·75 mm. altum, stylo 3·5 mm. longo, stigmate bilobo 2 mm. longo. *Fructus* ignotus.

Surat, Ban Kawp Kep, 100–200 m., climbing on bushes on rocky limestone hill, *Kerr* 13353.

Jasminum Craibianum *Kerr* [Oleaceae] ; ex affinitate *J. Griffithii* C. B. Clarke atque *J. rufo-hirti* Gagnep., ab ambobus foliis minoribus, floribus longe pedicellatis, calycis lobis longioribus distinguendum.

Frutex scandens, ramulis dense rufo-hirsutis, pilis patentibus. *Folia* simplicia, opposita, oblongo-obovata vel elliptica, basi cuneata vel rotundata, apice abrupte acuteque acuminata, ad 10 cm. longa, 4 cm. lata, supra pilis appressis sparse instructa, subtus rufo-hirsuta, praesertim secus costam nervosque, nervis lateralibus 5–7-paribus, supra inconspicuis subtus cum costa prominulis, nervis transversis inconspicuis ; petiolus 4–8 mm. longus, dense rufo-hirtus, pilis patentibus. *Inflorescentia* terminalis vel lateralis, 3–5-flora, foliis multo brevior, 3·5–5 cm. longa ; pedunculus communis subnullus vel ad 2 cm. longus, cum pedicellis dense patenti-hirtus ; pedicelli graciles, 1–1·5 cm. longi ; bracteae lineares, ad

4 mm. longi. *Calycis* tubus 2 mm. longus, ut lobi dense rufo-hirtus ; lobi 5, lineares, 9–10 mm. longi. *Corolla* alba, glabra, alabastro apice longe sensimque attenuato ; tubus gracilis, 20 mm. longus ; lobi 7–8, lineari-oblongi, subacuti, 14 mm. longi, 2 mm. lati. *Stamina* tubi apicem versus inserta, subsessilia, antheris mucronatis 2·5 mm. longis. *Ovarium* obtusum, 0·75 mm altum, stylo gracili 12 mm. longo. *Fructus* ignotus.

Lomsak, Kao Keo Ngoi, c. 1000 m., evergreen forest, *Kerr* 5755.

This species is also represented by a collection from Laos (Chieng Kwang, Muang Awm, c. 1000 m., *Kerr* 20970).

Jasminum insularum *Kerr* [Oleaceae] ; a *J. carissoidi* Kerr foliis pro rata angustioribus, basi rotundatis, haud cordatis, distinguendum.

Frutex scandens, ramulis teretibus laevibus nisi raro lenticellis magnis ovalibus obsitis, juventute minute puberulis mox glabrescentibus. *Folia* opposita, simplicia, forma magnitudineque variabilia, ovata, oblongo-ovata, vel fere linearia, basi rotundata, apice obtusa vel rotundata, mucronata, margine revoluta, 1·5–5·5 cm. longa, 0·6–2·7 cm. lata, rigide coriacea, supra nitida, subtus opaca et minute verruculosa, utrinque glabra, costa supra impressa subtus prominente, nervis lateralibus 1–2-paribus e basi orientibus subconspicuis, ceteris inconspicuis ; petiolus 2–3 mm. longus, minute puberulus. *Flores* ut videtur solitarii, terminales vel axillares ; bracteae subulatae, ad 2 mm. longae, minute puberulae. *Calyx* haud visus. *Corollae* tubus cylindricus, glaber, 27 mm. longus ; lobi 8, oblongi, acuminati, longitudine et latitudine variabiles, ad 18 mm. longi, 6 mm. lati. *Stamina* 11 mm. supra basin tubi inserta, antheris mucronatis 5·5 mm. longis. *Ovarium* non visum ; stylus gracilis, 21 mm. longus, stigmate breviter bilobo. *Fructus* ignotus.

Pang-nga, Pulau Tebun, *Haniff et Nur* 3605.

The material on which the above description is based consists of a branch with most of the leaves detached, and two detached flowers. Though this is poor material, it indicates such a distinct species that it has been considered worthy of description.

Jasminum plumosum *Kerr* [Oleaceae] ; a *J. annamensi* Wernham, cui affinis, calycis lobis multo longioribus, corollae tubo longiore differt.

Frutex scandens, ramulis teretibus dense fulvo-pubescentibus. *Folia* simplicia, opposita, late ovata, basi rotundata vel truncata, apice breviter acuminata, acuta, usque ad 8 cm. longa, 6 cm. lata, chartacea, siccitate supra olivacea, subtus pallidiora, supra sparse appresseque pubescentia, subtus sat dense fulvo-pubescentia, costa cum nervis supra impressa, subtus prominente, nervis lateralibus utrinque 3–4 acute ascendentibus leviter arcuatis prope marginem obscure anastomosantibus ; folia suprema sub inflorescentia posita, minora, anguste elliptica, basi apiceque longe attenuata ; petiolus

0·7–2·5 cm. longus, medio articulatus. *Inflorescentia* ramulum lateralem terminans, trichotoma, omnino dense pubescens ; cymae secundariae plus minusve longe pedunculatae, pedunculis ad 5 cm. longis, cymulis subcapitatis ; bracteae anguste lanceolatae vel lineares, 10–15 mm. longae ; pedicelli 1–2 mm. longi. *Calyx* patenter pubescens ; tubus 1·5 mm. longus ; lobi 6–7, filiformes, plumosi, 18–25 mm. longi. *Corolla* alba, glabra ; tubus gracilis, 25 mm. longus ; lobi 6–7, lineari-lanceolati, apice breviter acuteque acuminati, 12 mm. longi, 2·5 mm. lati. *Antherae* 4 mm. longae, breviter mucronatae, filamentis 1 mm. longis suffultae. *Stylus* 7 mm. longus, dimidio superiore incrassatus.

Chantabun, Makam, c. 50 m., in evergreen forest, *Kerr* 9594.

Jasminum Putii *Kerr* [Oleaceae] ; affine *J. Roxburghiano* Wall., foliis basi cordatis, inflorescentiae pedunculo multo breviore, inter alia, differt.

Frutex omnino griseo-puberulus, ramulis novellis subquadrangularibus. *Folia* opposita, simplicia, deltoidea, basi late cordata, apice obtusa, ad 3·5 cm. longa et lata, chartacea, siccitate supra olivacea, subtus interdum cyaneo-tincta, supra parce, subtus dense griseo-puberula, costa ut nervi supra inconspicua subtus prominente, nervis lateralibus 5–6-paribus, 2 paribus proximis e basi orientibus arcuatis prope marginem evanescentibus ; petiolus 10–11 mm. longus, puberulus, infra medium articulatus. *Inflorescentia* terminalis, cymosa, patens, 15–20-flora, omnino puberula, ad 3 cm. longa, 5 cm. lata ; pedunculus communis subnullus ; pedunculi secundarii ad 1·5 cm. longi ; bracteae subulatae, ad 4 mm. longae ; pedicelli 5–8 mm. longi. *Calyx* campanulatus, puberulus ; tubus 1·5 mm. longus ; lobi 5–6, triangulares, 0·5 mm. longi. *Corolla* non visa. *Fructus* simplex (an semper ?), ovoideus, 5 mm. diametro.

Nakawn Sawan, Hua Wai, *Put* 4092.

Jasminum rarum *Kerr* [Oleaceae] ; *J. Ritchiei* C. B. Clarke affine, inflorescentia saepius uniflora, calycis lobis brevioribus distinguitur.

Frutex scandens, fere glaber, ramulis teretibus gracilibus glabris juventute leviter compressis. *Folia* simplicia, opposita, lanceolata vel ovato-lanceolata, basi rotundata vel late cuneata, apice sensim et sat longe acuteque acuminata, 5–7 cm. longa, 1·8–2·8 cm. lata, membranacea, supra nitidula, siccitate fusco-viridia, subtus opaca, paululo pallidiora, minute papuloso-punctata, supra basin versus costa parum pubescente, subtus nervorum axillis interdum hirsutis, ceterum glabra, costa supra leviter impressa cum nervis subtus prominula, nervis lateralibus 4-paribus ascendentibus sensim arcuatis et sat longe a margine anastomosantibus, nervis transversis interdum subconspicuis ; petiolus 2–5 mm. longus, supra concavus, crispatim pubescens. *Inflorescentia* axillaris, rarius terminalis, saepius uniflora ; pedunculus communis subnullus, basi bracteis minutis instructus ; pedicellus 15–20 mm. longus, pergracilis, bracteolis linearibus

circiter 1 mm. longis munitus. *Calycis* tubus infundibuliformis, glaber, 2 mm. longus ; lobi triangulares, 0·75 mm. longi. *Corolla* alba ; tubus pergracilis, apicem versus parum ampliatus, 22 mm. longus ; lobi circiter 6, oblongo-lanceolati, apice acuti, 10 mm. longi, 1·5 mm. lati. *Stamina* tubi corollae apicem versus inserta, antheris 4·5 mm. longis breviter mucronatis subsessilibus. *Ovarium* 1 mm. altum, stylo cum stigmate 20 mm. longo. *Fructus* ignotus.

Kanburi, Baw Re, *Put* 211.

Only one collection of this plant has been seen, hence its specific name. In addition to its affinity with *J. Ritchiei*, this species is very closely related to a Philippine plant, *J. oliganthum* Merrill, which has longer calyx-teeth, and leaves with a distinct vein reticulation.

Jasminum sempervirens *Kerr* [Oleaceae] ; species *J. crassifolio* Blume affinis, foliis majoribus, floribus minoribus, inter alia, differt.

Frutex scandens, glaber, ramulis novellis leviter compressis lenticellis parce obsitis. *Folia* simplicia, opposita, late elliptica vel oblongo-elliptica, apice breviter obtuseque acuminata, basi rotundata vel late cuneata, margine breviter revoluta, 12·5–22 cm. longa, 6–10 cm. lata, coriacea, siccitate supra olivacea, subtus pallidiora minute glanduloso-punctataque, glabra nisi subtus interdum in nervorum axillis barbata, costa supra impressa subtus valde prominente, nervis lateralibus 6–7-paribus supra subconspicuis subtus prominentibus prope marginem arcuatis et obscure anastomosantibus ; petiolus crassus, irregulariter curvatus, infra medium inconspicue articulatus, 1·5–2·5 cm. longus. *Inflorescentia* axillaris, trichotoma, circiter 10–flora ; pedunculus communis nullus vel perbrevis ; pedunculi secundarii 3–3·5 cm. longi. *Calyx* campanulatus, 3·25 mm. longus, minute glanduloso-punctatus, breviter 5-dentatus, dentibus 0·25 mm. longis margine minute ciliatis. *Corolla* alba, alabastro apice obtuso ; tubus 26 mm. longus, triente superiore parum ampliatus ; lobi 7–8, oblongi, apice rotundati, 13 mm. longi, 5 mm. lati. *Stamina* corollae tubi triente superiore inserta ; antherae breviter mucronatae, 5·5 mm. longae ; filamenta 0·5 mm. longa. *Ovarium* apice bilobum, 1 mm. altum ; stylus cum stigmate 8 mm. longus. *Fructus* ignotus.

Chiengmai, Me Rim, c. 600 m., evergreen forest, *Kerr* 6445.

Jasminum stellipilum *Kerr* [Oleaceae] ; ab affini *J. Evansii* Ridl. foliis ellipticis, indumento foliari densiore differt.

Frutex scandens, ramulis novellis dense stellato-pubescentibus, mox glabrescentibus. *Folia* saepius elliptica, interdum elliptico-obovata, basi late cuneata, apice breviter acuteque acuminata, ad 8·5 cm. longa, 3·5 cm. lata, supra sparse stellato-pubescentia mox glabra, subtus sat dense stellato-pubescentia, praesertim secus costam nervosque, costa supra impressa subtus cum nervis prominente, nervis lateralibus 3-paribus ascendentibus ;

petiolus 3–5 mm. longus, pubescens, articulatus, supra alte canaliculatus. *Inflorescentia* axillaris vel terminalis, 2–3-flora ; pedunculus communis subnullus vel usque ad 7 mm. longus, cum pedicellis bracteisque dense pubescens ; pedicelli 1–2 mm. longi ; bracteae lineares, 2–3 mm. longae. *Calyx* dense pubescens ; tubus 2 mm. longus ; lobi 6–7, lineares, 3 mm. longi. *Corolla* alba, glabra ; tubus 22 mm. longus ; lobi 8, oblongo-lanceolati, apice subacuti, 11 mm. longi et 3·5 mm. lati. *Stamina* in medio tubi inserta, subsessilia, antheris 3·5 mm. longis. *Stylus* gracilis, 15 mm. longus. *Fructus* ignotus.

Ranawng, Kao Talu, c. 50 m., climbing in scrub, *Kerr* 11809.

Jasminum trangense *Kerr* [Oleaceae] ; *J. Wrayi* King et Gamble affinis, sed foliorum nervis lateralibus paucioribus, inflorescentia pauciflora laxioreque differt.

Frutex scandens, glaber, ramulis gracilibus teretibus. *Folia* late elliptica, vel ovato-elliptica, basi late cuneata, apice leviter acuminata, mucronata, chartacea, 12–15 cm. longa, 5–8·5 cm. lata, glabra nisi subtus ad nervorum axillas interdum barbata, costa supra leviter impressa subtus ut nervi prominente, nervis lateralibus 3–6-paribus ascendentibus leviter arcuatis prope marginem evanescentibus ; petiolus 7–15 mm. longus, infra medium articulatus, supra canaliculatus. *Inflorescentia* terminalis vel lateralis, laxe 2–10-flora, interdum ut videtur racemosa, ad 15 cm. longa ; pedunculus communis 2·5–7 cm. longus ; bracteae subulatae, 2 mm. longae ; pedicelli graciles, 1·5–3 cm. longi. *Calyx* 5–6-partitus, glaber ; tubus 1·5 mm. longus ; laciniae lineares, 6–8 mm. longae. *Corolla* alba, alabastro apice longe attenuato ; tubus superne sensim ampliatus, 17 mm. longus ; lobi 6–8, linearilanceolati, apice sensim acuminati, acuti, 17 mm. longi, 2·5–4 mm. lati. *Stamina* corollae tubi apicem versus inserta, inclusa, antheris mucronatis 6 mm. longis, filamentis 0·5 mm. longis. *Ovarium* 1 mm. altum, stylo gracili cum stigmate claviforme 15 mm. longo. *Fructus* ignotus.

Trang, Palien, under 50 m., in evergreen forest at foot of limestone hill, *Kerr* 19099.

Jasminum virgatum *Kerr* [Oleaceae] ; species habitu erecto, foliis lineari-lanceolatis, calycis lobis filiformibus distincta.

Frutex erectus, usque ad 1 m. altus, simplex vel parce ramosus, omnino puberulus. *Folia* simplicia, opposita, lineari-lanceolata, basi anguste cuneata, apice sensim attenuata, acuta, margine plus minusve revoluta, ad 7·5 cm. longa et 1·2 cm. lata, chartacea, supra glabrescentia nisi secus costam puberula, subtus minute pustulata glanduloso-punctataque, secus costam puberula, costa supra alte impressa subtus prominente, nervis lateralibus 2–3-paribus ascendentibus supra inconspicuis subtus prominulis ; petiolus puberulus, infra medium articulatus, 3–4 mm. longus. *Inflorescentia* terminalis, vel rarius lateralis, sessilis vel subsessilis,

compacta, puberula, 3–6-flora, bracteis lineari-lanceolatis ad 11 mm. longis, pedicellis 3–5 mm. longis. *Calycis* tubus infundibuliformis, puberulus, 2 mm. longus ; lobi 5–6, filiformes, puberuli, ad 17 mm. longi. *Corolla* non visa. *Bacca* ovoidea, simplex, c. 7 mm. longa.

Nawngkai, Pon Pisai, c. 200 m., open deciduous forest, *Kerr* 8580.

V—NEW OR LITTLE KNOWN PLANTS FROM SOUTH INDIA: VIII.*

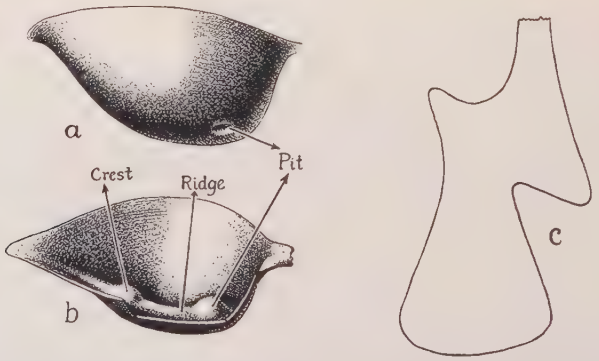
Biophytum intermedium Wright [Oxalidaceae].

In the Fl. of the Pres. Madras this species is stated to occur in the Pulney Hills, but all the specimens so identified in the Kew Herbarium belong to the variety *pulneyense* Edgew. et Hook. f. The typical plant, known from Ceylon, has now, however, been found in S. India.

Tinnevelly District near Nadugani, in evergreen forest, 2000–2500 ft., fls. Dec., *E. Barnes* 1392, 1404. Stems procumbent, up. to 30 cm. long.

Impatiens munnarensis *E. Barnes*, sp. nov. [Balsaminaceae].

I. pusillae Heyne affinis, sed multo major diffusiorque, floribus majoribus, labello parte inferiore foveolato intus costato et cristato differt.



Impatiens munnarensis E. Barnes. a, Diagram of lip seen from below showing pit ; b, Diagram of lip (partly cut away) seen from above showing pit, ridge and crest ; c, outline of wing (all × 4).

A weak erect or semi-erect *herb* up to 1 m. high ; stem slender, sparingly branched, often procumbent below and rooting at the nodes. *Leaves* variable, usually lanceolate, broadest at the shallowly cordate base, tapering to an acute apex, sometimes narrowly ovate with a subacute base, up to 5·5 cm. long and 1·7 cm. wide, usually narrower, margins distantly serrate with apiculate teeth becoming setose at the base, pubescent above, glabrous and pale, sometimes glaucous, below ; petioles up to about the length of the blade,

---

* Continued from K.B. 1936, 278.

flattened and red above, decurrent on the stem and forming filiform pointed stipules ; stipules red with darker tips, bent twice at right angles, finally pointing downwards, a rib running down the stem below each to the next node. *Pedicels* solitary or up to 4 fascicled in the axils, very short in bud, in flower 1–2·5 cm. long, only partially reflexed in fruit, with a longitudinal line of hairs. *Flowers* 1–1·3 cm. long. *Lateral sepals* filiform, curved, 6 mm. long. *Lip* boat-shaped, cuspidate in front, white with purple veins, bottom somewhat flattened with a small pit instead of a spur, inside convex and continued forward as a ridge with a small yellow or orange crest about the middle. *Standard* ovate, keeled, tip mucronate. *Wings* white with lilac or violet markings ; distal lobe obovate-triangular ; basal lobe triangular ; dorsal auricle bluntly conical or rounded, placed at right angles, very dark-purple. (The two auricles lie near and parallel to one another a little below the stamens.) *Capsules* fusiform, slender till the seeds swell and about as long as the flowers, later swollen, acuminate, 1·3–1·5 cm. long, few-seeded. *Seeds* black, glossy, 1·5 mm. long.

Travancore : High Range near Munnar, 4000 ft., common on the edges of streams and in marshy places, fls. and frt. Sept.–Dec., *E. Barnes* 571, 573, 574, 575, 576, 1275, 1276, 1277, (in Barnes' Herb.) 1281, 1282 (type—in Kew Herb.)

The depression on the underside of the lip appears to be a unique feature in this group of balsams, but it is not easily seen in dried specimens.

Impatiens pandata *E. Barnes*, sp. nov. [Balsaminaceae].

I. akka Bedd. peraffinis, sed robustior, foliis glabris apice rotundatis, scapo parte superiore abrupte deflexo, floribus majoribus, labello sine calcari distat.

A small, succulent, scapigerous *herb* ; tuber spherical, 7 mm. diam., white. *Leaves* radical, solitary or few, orbicular-reniform, base cordate, 1·7–4·5 cm. diam., rather thick and fleshy, glabrous, green above, dark-purple below, margins very shallowly crenate, basal nerves 3–4 pairs, curved, not reaching the margins, one pair of nerves arising from a little higher up ; petioles 2·6 cm. long. *Scape* solitary up to 20 cm. long to the first flower, usually much shorter, rather thick and succulent, pale-green with numerous red streaks, bent abruptly at right-angles at the first pedicel. *Raceme* 9– or fewer-flowered ; lower bracteoles broad and short, upper narrowly ovate, up to 5 mm. long ; pedicels slender, up to 2·7 cm. long, in fruit hanging down. *Lateral sepals* about the size of the bracteoles, streaked brownish-red. *Lip* spoon-shaped, spurless, posteriorly light brownish-purple shading to white anteriorly. *Standard* broadly elliptic with the long axis sideways, concave, margin entire, 1 cm. wide. *Wings* 3-lobed, up to 2·9 cm. long ; lobes oblong, rounded, the two upper curved outwards, white slightly tinted with a dark shade of blue within, hairy at the base

within. *Capsules turgid*, 1·2 cm. long, glabrous. *Seeds* very numerous, narrowly ovoid, 1 mm. long, reddish-brown, covered with scattered white granules which swell to hairs when wetted.

Travancore : High Range, Anaimudi slopes, 8000 ft., on wet rocks, often in cushions of moss., fls & frt. Sept., *E. Barnes* 535, 537 (type in Kew Herb.), 534, 536 (in Barnes' Herb.)

I. akka Bedd., *I. nilagirica* C. E. C. Fischer and *I. pandata* E. Barnes are very similar plants occurring in similar situations on the Coimbatore Anaimalais, the Nilgiris and Travancore High Range respectively. Beddome's original description of *I. akka* in the Madr. Journ. (1858) is very brief and no further details about it appear to have been published. Later Beddome united it with his *I. crenata* from which, however, it differs in several particulars. The type of *I. akka* (Beddome 840) in the Brit. Mus. appears to be the only material available. It has cordate leaves rounded at the apex, up to 2·5 cm. diam, with scattered hairs on the upper surface ; the scape is not bent ; the lip has a bluntly conical spur ; the wings are up to 1·6 cm. long. *I. pandata* differs from it in all these characters and still more from *I. crenata*.

Osbeckia kewensis *C. E. C. Fischer*, nom. nov. [Melastomataceae].

In Bot. Mag. t. 5085, published in 1858, a plant grown in Kew Gardens from seed obtained from Ceylon was figured as *Osbeckia aspera* Wight et Arn. (1834). But this plant is not the same as that described under the same name by Blume in 1831 (Flora, **14**, 474), as was recognised by Triana in 1873 who identified it as *O. glauca* Benth. in Wall. Cat. (Trans. Linn. Soc. **28**, 54). This name, however, was invalid since it had already been used in 1850 by Naudin (Ann. Sc. Nat. Ser. 3, **14**, 68) for a different plant from Sylhet, sent to him by Bentham.

On the cover containing the sheets of the plant figured in Bot. Mag. t. 5085, the late Mr. Gamble has pointed out that they are not at all the *O. glauca* of sheet no. 4073A of the Wall. Cat. on which that name is inscribed. Actually that sheet contains 3 different species which Mr. Gamble has identified as : 1. *O. aspera* Bl., from Courtallam, S. India ; 2. *O. minor* Triana, from the Travancore Hills of S. India, and 3. *O. glauca* Benth. from Trincomali in Ceylon.

The plant under discussion does not agree with any of the three. It differs from *O. aspera* Bl. by the rather long and often dense bristles on the twigs, especially at the nodes, the wider and more bristly leaves and the stellately bristly calyx-tube ; and from *O. glauca* Naud, by the distinctly petioled leaves, the bristly calyx-tube and the 5- merous corrolla. Prof. E. Barnes has recently found it in S. India.

As neither of the two epithets applied are available for it and as it was described from plants grown at Kew, I propose to call it *O. kewensis*.

Ceylon : loc. incert., type (cult.) in Kew Herb.

S. India : Travancore, Munnar, fls. Sept., *E. Barnes* 1357,

Osbeckia wynaadensis *C. B. Clarke* [Melastomataceae].

Reported from Wynaad only.

Cochin : Perambikulam Hills, Kuriarkutti, fls. Dec., *E. Barnes* 994.

The plants found by Prof. Barnes are considerably larger than the Wynaad specimens and it is desirable to record the dimensions.

Shrub over 2 m. high ; leaves up to 18·5 cm. long and 6·2 cm. wide ; petioles 1·5 cm. long ; calyx-tube up to 1 cm. long ; petals up to 2·1 cm. long.

Sonerila Barnesii *C. E. C. Fischer*, sp. nov. [Melastomataceae].

S. tinnevelliensi C. E. C. Fischer peraffinis, ramulis quadrangularibus canaliculatis, foliis ovatis basi rotundatis, pedunculis longioribus, floribus paucioribus, tubo calycis nudo vel fere nudo distincta.

An erect *herb* ; stems up to 24 cm. tall, rooting near the base, branching above, terete at the base, quadrangular and channelled on 2 opposite sides above. *Leaves* thinly membranous, ovate, acute or obtuse, base rounded or subcordate, one side usually 3–7 mm. longer than the other, 3–7 cm. long, 1·8–3·7 cm. wide, margins finely serrate, the teeth pointing forward, becoming ciliae at the base, deep green and with scattered bristles above, paler and almost glabrous below, basal ribs 2 on the longer side usually inserted below the base of the other side, not reaching much above the middle, a third arising from somewhat higher up and running almost to the apex, on the shorter side the outer rib running to about the middle and the inner almost to the apex, veins slender, ascending, ultimate reticulations fine ; petioles slender, channelled, 1–5 cm. long, glabrous except for a very few ciliae near the apex, red. *Cymes* terminating the stem and its branches ; peduncles 1·2–3 cm. long, 4–11-flowered ; pedicels 3–5 mm. long in flower, very little longer in fruit. *Calyx-tube* narrowly funnel-shaped, 6-ribbed, the ribs more of less decurrent on the pedicel, 6 mm. long, green, glabrous or with a few glandular hairs (fide Barnes) ; lobes very broadly ovate, acute, 1 mm. long, reddish-green. *Petals* broadly elliptic-ovate, apiculate, 1-ribbed, 7·5–8·5 mm. long, 5–6 mm. wide, very pale-pink, a little deeper in shade on the back where exposed in bud. *Stamens* 3 ; filaments glabrous, 2·5 mm. long ; anthers cordate, bluntly acuminate, 2·5 mm. long. *Style* slender, 5 mm. long. *Capsules* narrowly turbinate, 6-ribbed, 7–8 mm. long, glabrous, pale-brown, darker on the ribs, shining. *Seeds* minute, oblanceolate, brown, muriculate on the rounded apex.

Tinnevelli Hills, near Nadugani, 2500 ft., fls. & frt. Dec., *E. Barnes* 1405 (type in Kew Herb.), 1414.

" A form with leaves dark-red below and deep-pink petals was found, but was scarce " (Barnes).

Ophiorrhiza munnarensis *C. E. C. Fischer*, sp. nov. [Rubiaceae].

O. pallidae Thw. affinis, sed minor, foliis angustioribus nervis paucioribus margine ciliolatis, cymis minoribus terminalibus,

bracteis multo latioribus, corollis angustioribus longioribus ore glabris, antheris semiexsertis, filamentis brevioribus, stylo filamentorum basin attingente differt.

A *herb* or *undershrub* ; stems erect or procumbent and rooting below, 5–13 cm. long, the larger woody and glabrous below, more or less densely short brown-hairy upwards or hairy throughout. *Leaves* elliptic-lanceolate, acute to caudate-acuminate, base tapering and sometimes shortly decurrent, 2·5–6·7 cm. long, 1·1–2·4 cm. wide, lateral nerves 6–8 pairs, arching, anastomosing close to the ciliolate margins, dark-brown when dry and with scattered, often curled, hairs above, pale and with fewer hairs below ; petioles slender, 3–12 mm. long, puberulous ; stipules ensiform, acuminate or setaceous and finely acuminate, glabrous or nearly so. *Cymes* terminal, small, capitate ; peduncle slender, 2·5–3·5 cm. long, glabrous ; bracts linear-lanceolate in flower, becoming oblong-ovate in fruit, 5–8 mm. long, pale and thinly membranous in flower, brown (when dry) and stiffer in fruit ; pedicels 1 mm. long, glabrous. *Calyx-tube* 0, or very short ; lobes 5, rarely 2 united for more than half their length, elongate triangular, 1·3–1·6 mm. long, glabrous. *Corolla* elongate funnel-shaped, 9·5 mm. long, glabrous except for a band of crisped hairs (pale-brown when dry) within at the base of the stamens ; lobes 5, ovate, acute, 2 mm. long. *Stamens* 5, inserted a little above the middle of the corolla-tube ; filaments slender, 2 mm. long ; anthers linear, slightly shorter than the filaments, half exserted. *Disk* of 2 fleshy quadrate lobes 0·6 mm. long. *Ovary* narrowly turbinate, 1·8 mm. long ; style 4·4 mm. long, slender below, narrowly fusiform in the upper $\frac{1}{3}$, shortly bifid, just about reaching the base of the filaments. *Fruit* (not quite mature) 1·6 mm. long, 4·1 mm. wide, crowned by the disk-lobes.

Travancore : Munnar Ghat road, 4000–5000 ft., fls. & frt. Sept., E. Barnes 2005 (type in Kew Herb.) ; Cochin, Perambikulam Hills, 3000 ft., fls. Dec., *E. Barnes* 2004.

Exacum pumilum *Griseb.* [Gentianaceae].

Known from the Bombay Presidency.

On p. 875 of the Fl. Pres. Madras a specimen from the Anaimalais is referred tentatively to this species. A similar plant, differing from the type only by being less branched, has been found by Prof. Barnes and the species should now be added to the Flora of Madras.

Cochin : Perambikulam Hills, Vengolimalai, 4000 ft., on wet rocks, fls. bright blue, Sept., *E. Barnes* 1268.

Didymocarpus Gambleana *C. E. C. Fischer*, nom. nov. [Gesneriaceae].

The first use of the combination *Didymocarpus lanuginosa* was made in MS. on sheet No. 791 of the Wallich Herb. and was validated by A. de Candolle in his Prod. **9**, 268 in 1845 by a description.

In 1883 in Monogr. Phanerog. **5**, 66, C. B. Clarke transferred this species to another genus as *Didissandra lanuginosa*.

Wight applied the epithet *Didymocarpus lanuginosa* in MS. to his sheet No. 561 (now in Kew Herb.) and this C. B. Clarke in Monogr. Phanerog. **5**, 102, reduced to *D. Rottleriana* Wall. var. *lanuginosa*.

In 1924 in Fl. Pres. Madras, 989, Gamble restored Wight's 561 to specific rank as *D. lanuginosa* Wt., not of Wall. As this combination had already been applied to another and validly published species Wight's plant must receive a new name and I propose the combination at the head of this paragraph.

Didymocarpus macrostachya *E. Barnes*, sp. nov. [Gesneriaceae]; a *D. Gambleana* C. E. C. Fischer foliis oblongatis vel anguste ovatis sessilis, scapo longiore robustiore, cymis dichotomis, floribus majoribus, scapis calycibus et capsulis eglandulosis, capsulis angustioribus differt.

A perennial, scapigerous *herb*; roots felted. *Leaves* in a radical rosette, oblong to narrowly ovate, apex rounded, tapering or abruptly narrowed to the base without any definite petiole, 11–17 cm. long, 4–7 cm. wide, margins obscurely crenate, dull-green and velvety with a dense mat of curved hairs above, pale-brown felted below, the young leaves very pale-green and very soft above, thickly brown-felted below, the felt obscuring the bases of the leaves and the central bud; lateral nerves 5–6 pairs, veins reticulate, all more or less indistinct owing to the hairs. *Scapes* 1 or more, rather stout, terete, grooved on 2 opposite sides, up to 44 cm. long, densely pale-brown felted. *Calyx-lobes* ovate, obtuse, 6 mm. long, 3 broad, 2 narrow, glabrous and 3-nerved within, so densely tomentose without that the lobes cannot be distinguished. *Corolla* broadly campanulate, 1 cm. long, up to 1·9 cm. across, mouth oblique; lobes orbicular, pale-blue or mauve, downy without and dotted with small, sessile, yellow glands. *Stamens* included, 2 perfect with filaments 2·5 mm. long and spherical anthers 1·5 mm. diam., 2 reduced to slender filaments 2·5 mm. long with curved or hooked ends. *Ovary* 4 mm. long, tomentose; style 3 mm. long; stigma not wider than the style. *Capsules* linear, stout, up to 1·5 cm. long, acute, light-brown tomentose. *Seeds* minute, ovoid, flattened, reddish-brown (possibly not mature).

Travancore: High Range, on the Ottaparai Ridge, 5500 ft., on rocks exposed for a large part of the year to monsoon conditions, fls. and almost mature capsules Sept., *E. Barnes* 1263, 1265 (in Barnes' Herb.), 1264, 1266 (type in Kew Herb.)

Amorphophallus commutatus *Engl.* [Araceae].

Known only from the Konkan.

S. Malabar, Sappal, fls. May, *P. V. Mayuranathan* without number (in Kew Herb.).

VI—ON THE OCCURRENCE OF FAGUS ORIENTALIS IN GREECE. O. Grebenchikoff.

The occurrence and distribution of *Fagus orientalis* in the kingdom of Greece has been very little investigated. In 1934 the author found a beech in the ravines of Mt. Olympus, Thessaly, which agreed in the characters of leaves and fruits with *F. orientalis*. Another excursion was undertaken in 1936 with the aim of collecting new data concerning the distribution of the beech in Greece. During this excursion Mt. Ossa and the whole length of Athos Peninsula were explored and the results are incorporated in the present paper.

Madame Hanna Czeczott, in her paper published in 1932 (6) summarized the Greek records to that date, as follows :—

Cekir Dagh, Thrace (Stoyanoff 1927) ; Hagion Oros, Athos (Koch, after Grisebach) ; Mt. Kholomunda, Chalkidiki (Mattfeld) ; Mt. Ossa, Thessaly (Heldreich, 1882 under *F. silvatica*) ; Oxya Mtns, Aetolia (de Vaillant) ; Euboea (Deprat, 1905). These records are doubtful, or the specimens on which they are based are scanty.

Mt. Ossa, Thessaly.

The whole eastern slope of Mt. Ossa (2000 m.), facing the sea, is almost completely covered with dense luxuriant forests from sea-level to 1600 m. Three major zones are distinguishable.

1. A zone of macchie, from the sea shore up to 400–500 m., with the following species predominant: *Quercus Ilex, Phillyrea media, Erica arborea, Ostrya carpinifolia, Quercus coccifera, Cistus villosus, Cercis Siliquastrum, Juniperus Oxycedrus, Similax aspera.*

2. Chestnut and oak forests, between 400 and 900 m., with *Castanea sativa, Quercus petraea,* and *Q. lanuginosa* dominant, and including, among others, the following species : *Quercus Ilex, Tilia cordata, T. tomentosa, Fraxinus Ornus,* and *Acer campestre*

3. Luxuriant beech forests, from approximately 900–1000 m., up to the very limit of the woody vegetation.

Heldreich (1882) noted the presence of beech forests on Mt. Ossa between 915 and 1220 m. My observations, however, showed that the beech forests in some places extend to 1600 m. altitude.

Beech on Ossa is mentioned by Heldreich under the name *Fagus silvatica*. It is true that the beech forests between 950 and 1600 m. altitude consist mainly of beech trees with taxonomic characters very similar to those of *F. silvatica*. After a closer examination, however, of the ravines stretching from the sea towards the centre of the mountain, I found groups of beech trees differing considerably from *F. silvatica*, and occurring, not in the zone of beech forests but in that of *Castanea* and *Quercus*.

The taxonomic features distinguishing *F. orientalis* from *F. silvatica* are as follows (10) :

Fagus silvatica.	*Fagus orientalis.*
1. Leaf oval, medium in size; with up to 8 or 9 pairs of side-nerves.	1. Leaf elongated, large, often with a narrowed base; with up to 14 pairs of side-nerves.
2. Bracts of the fruit-involucre awl-like, hard, pointed, short, brownish.	2. Bracts of the fruit-involucre long, linear or linear-spathulate, enlarging at the top in the form of a little narrow green spade.
3. Lobes of the perianth of the male flowers narrow or pointed, longer than the tube of the perianth.	3. Lobes of the perianth of the male flowers obtuse, rounded, shorter than the tube of the perianth.

The following is a summary of the results that have been obtained after an examination of the leaves and fruit-involucres of a considerable number of trees on Mt. Ossa. Unfortunately, since the material was collected in the second half of the summer, no data concerning the third character (male flowers), could be procured.

All the beeches examined by me and differing from typical *Fagus silvatica*, can be arranged according to their taxonomic features into two groups:

(1) Leaves soft and thin, very large, up to 11·5 cm. in length, mostly with narrowed bases, sometimes resembling in shape the leaves of a chestnut tree, or oval but very wide, with elongated apical part; with from 10 to 14 pairs of side-nerves. Taxonomic features of the leaves completely corresponding to those of *F. orientalis*.

Practically no fruit was found, the trees being of a bushy type, or occasionally large trees occurred but also without a single fruit.*

Trees of this type grow at the bottom of the ravines, in their narrowest and darkest parts, where the sun's rays very rarely penetrate. The leaves are distinctly of a mesophytic type, but probably the complex of ecological conditions is not favorable for fruiting.

(2) Leaves harder, medium in size, from 8 to 9 cm. long, oval or with a markedly narrowed base. The number of side nerves almost always 8 to 9. The taxonomic features thus approximate to those of *Fagus silvatica*. Abundant fruiting. Peduncles about 2·5 cm. long. The bracts of the fruit-involucre are green and leaf-like near the apex of the fruit, but thin, soft and very long (up to 2 cm. long) at its base, making the fruit-involucres look curly green. Occasionally, fruits are found with less characteristic bracts, but at the bottom of the fruit-involucre they are always long and thin. This taxonomic feature completely corresponds to that of *Fagus orientalis*.

Trees of this type grow in more abundantly lighted places on the edges of the ravines. The amount of sunlight in such places is

* In 1936 beech was fruiting very abundantly everywhere in Jugoslavia and Greece.

sufficient, and, apparently, the complex of the ecological circumstances gives the tree a possibility of normal fruiting.

It is evident that in no one specimen of the " doubtful " species of beech examined by me, the two main taxonomic features—those of the leaf and fruit-involucre—appeared together, since in cases where the leaves corresponded to those of *Fagus orientalis*, the fruits were always absent, while the specimens with leaves of *F. silvatica* type bore fruit with the taxonomic features of *F. orientalis*.

Brief reference may now be made to the ecological environment of beech of the two types described above. The altitude of their ranges above the sea level varies from 600 to 900, and, in some places up to 1000 m. The geological substrata consist of mica-schists and some other siliceous rocks. The zone of the occurrence of this beech extends from that of the zone of macchie, and from this it might be concluded that the annual mean temperature of the habitats is high. Samples of both types of beech have been found in groups or growing singly in the woody gorges and ravines. At the bottom of such ravines are streams with abundant water. Even on the hottest days the air is always cool and damp. The abundance of wet mosses on the walls of the ravines is an additional proof of their dampness. Since almost all of the ravines stretch west to east and on the southern sides are always shielded by one of their higher slopes, the intensity of the sunlight in them is very low. From the same circumstances the ravines are shielded by the northern slopes from the cold northern winds. Both of these factors, apparently, soften the climate, making it uniformly temperate and damp. The development of the types of beech mentioned above is normal, with the exception of samples growing at the bottom of the ravines. Such trees fruit very scantily, and are often greatly modified from their normal habit, and develop only as large sized shrubs. Whether this occurs as a consequence of some biotic factors (cutting down and grazing) or not, I was unable to ascertain.

In order to sketch out the social environment of both types* of *Fagus orientalis* I give below the most characteristic notes from various places (ravines) on Mt. Ossa. The species are in the sequence of most frequent first.

(1) 26.vii.1936. A woody ravine above the monastery of Ag. Dimitrios not far from the village of Tsaigesi. Altitude 700 m. Mica-schists. *Castanea sativa, Fagus orientalis, Tilia cordata, Ilex Aquifolium, Fraxinus Ornus, Aesculus Hippocastanum.*

(2) 29.vii.1936. A woody ravine at an altitude of 700 m., near the village of Karitza, not far from the village of Tsaigesi. Mica-

* In the future I shall mention these two types under the common name of *Fagus orientalis*, for their taxonomic features correspond to those of *F. orientalis* on Strandza in Bulgaria (Stoyanoff), and to the samples of this species in the herbarium of Belgrade Botanical Garden collected by Czerniavski and others.

schists. In the ravine there are blocks of limestone fallen from the upper portion of Mt. Ossa.

Trees :—*Platanus orientalis, Alnus glutinosa, Aesculus Hippocastanum, Taxus baccata, Ilex Aquifolium, Fraxinus Ornus, Fagus orientalis, Ficus Carica, Spartium junceum.*

Herbs :—*Inula viscosa, Rubia peregrina, Campanula incurva, Polypodium vulgare, Nephrodium lobatum, Asplenium Trichomanes, Cystopteris fragilis, Orchis maculata.*

(3) 29.vii.1936. In the same ravine at an altitude of about 900 m. The stream makes a small pond in a small, very damp hole. Abundance of mosses and ferns.

Trees :—*Fagus orientalis, Castanea sativa, Ilex Aquifolium, Platanus orientalis, Aesculus Hippocastanum, Quercus Ilex, Acer intermedium, Abies cephalonica, Fraxinus Ornus, Acer Reginae-Amaliae.*

Herbs :—*Ruscus hypoglossom, Scolopendrium vulgare, Dryopteri lobata, Nephrodium lonchitis, Polypodium vulgare, Epilobium palustre, Equisetum Telmateja, Carex pendulina, Poa nemoralis, Brachypodium distachium, Oxalis corniculata.*

Bryophyta :—*Fegatella conica, Plagiochilla asplenioides, Thamnium alopecurum, Mnium undulatum, M. punctatum, M. cuspidatum, Brachythecium rivulare, B. rutabulum, Homalothecium sericeum.*

On the rocks are also found :—*Umbilicus pendulinus, Sedum Cepaea, Samolus Valerandi, Agrostis vulgaris.*

If we try to draw a line between the distribution of *F. orientalis* and that of *F. silvatica*, we discover that it depends largely on the relief of the surface. Namely, that where a narrow and dark ravine gradually (towards the top of the mountains) becomes shallow and passes into a smooth open slope of the mountain, the taxonomic features of *F. orientalis* are gradually replaced by those of *F. silvatica*. While where the relief and microclimate change abruptly at the outlet of the ravine (on its slopes and edges) the beech also abruptly loses the characteristics of *F. orientalis* and acquires those of *F. silvatica*.

Above 900–1000 m. there stretch luxurious forests consisting of *F. silvatica*, and there beeches with taxonomic features of *F. orientalis* are no longer met with in any kind of ravine.

Chalcidice (Kholomonda Mts.).

According to Mattfeld, *F. orientalis* has been found by him on the Kholomonda Mts., Chalcidice Peninsula, at an altitude of 500 to 600 m. (3).

Unfortunately during my trip through these mountains I was able to make only a brief examination of several beeches of a beech forest on the steep slopes at an altitude of 600–700 m. I was unable to see fruiting specimens but the leaves of almost all the beeches examined by me, had up to 12 side-nerves. Above an altitude of 800 m. beeches with the taxonomic features of *F. silvatica* are to be found exclusively.

On my way from the village of Arnea to Stratoniki I was unable to collect any material, but I took the following notes on the mixed local forest vegetation at an altitude of 500–600 m. :—*Quercus conferta, Fagus orientalis, Castanea sativa, Erica arborea, Sorbus Aucuparia, Corylus Avellana, Populus tremula.*

It is reasonable to suppose that beeches growing among *Castanea sativa* and *Erica arborea* would not be typical *F. silvatica*, but would have the taxonomic features of *F. orientalis.*

Athos Peninsula.

The woody vegetation on the Athos Peninsula can be roughly grouped according to the following zones:

(1) From the sea shore up to the altitude of 400 m. there is a zone of wild impenetrable evergreen macchie where the following species are predominant :—*Quercus coccifera, Erica arborea, Spartium junceum, Phyllirea media, Quercus Ilex, Q. lanuginosa, Arbutus unedo, Pinus halepensis,* Pistacia Terebinthus, Cercis Siliquastrum, Cistus villosus, Coronilla emeroides, Osyris alba, Smilax aspera, etc.*

(2) Above an altitude of 400 m. as well as in places at an altitude of 300 m. there are oak woods showing predominance of the following species :—*Quercus conferta, Q. lanuginosa, Q. Ilex* (large trees), *Ostrya carpinifolia.*

(3) Still higher, approximately from 500–600 m. upwards, there are chestnut and fir forests (*Castanea sativa, Abies Borisii-regis*). Among these main species there can be also found *Ilex Aquifolium, Acer platanoides, Populus tremula.*

In the same altitudinal zone (500–900 m.) there can be found small groves of *Pinus nigra* and isolated groups of beech.

(4) Above 1000 m. on the peak of Mt. Athos in places where the slopes are more gradual (south-western, southern and partly south-eastern), there are growing very sparse forests of *Abies Borisii-regis* and *Pinus nigra*, which occur up to an altitude of 1800 m.

In the zone of the mixed chestnut-fir forests, in the deep shady ravines, running near the ridge of the main chain of the mountains, along the wooded road from the village of Karyes to the monastery of St. Paul, at an altitude of 800 m. I found some small groups of beech with the taxonomic features of *F. orientalis.*

Before I describe this beech and its ecology, I wish to repeat the information given by Mattfeld about the beech on Athos :

" Nach Grisebach soll auch Fagus silvatica, die er bestandbildend an den Westhängen der Berge etwas weiter südlicher fand, bis in den Wald oberhalb Karyes gehen. Wir suchten sie dort aber vergeblich."

On the western slopes of the mountain ridges, in the place mentioned above, I also was unable to find beech, but I found some in the ravines on the eastern slopes. It is quite possible that at the

* Forming groves of high trunked trees with an undergrowth consisting of other species of macchie.

time when Grisebach was there the beech forest actually did exist on the western slopes, but has now been cut down ; while in the place where it was found by me it has been conserved owing to its remoteness from any of the large monasteries and to the unfavourable circumstances for the transportation of wood.

The steep and deep ravines run from the mountain ridge down towards the sea. In four such ravines at an altitude of 800 m., I found *F. orientalis* everywhere. It we compare the taxonomic features of this beech with the beech of Mt. Ossa, we find that all the samples from Athos Peninsula examined by me belong to the second type, that is with the leaves generally rather small, hard, with 8 to 9 pairs of side nerves, the fruit-involucres being identical with those of typical *F. orientalis*. The bracts of the fruit-involucres either at their bases, or more commonly along their whole surface, are green, soft and very long, more than 2 cm. in length.

In one case only, there were found leaves of enormous size—11·5 cm. long with 10 to12 pairs of side-nerves. Such a tree was growing at the bottom of a dark ravine.

I give a brief description of the ecology of this kind of beech on Athos. It occurs in isolated groups among chestnut-fir forests on the slopes of ravines at an altitude of 800 m. Occasionally it is met with standing singly in deep dark woody ravines. Geologically these ravines can be regarded as consisting of gneiss and mica-schists. The moisture of such places is rather considerable and numerous but shallow streams cross the path.

Most of such ravines run west to east. The development of the trees is normal, the fruiting abundant. The composition of the forest where *F. orientalis* is met with is :—*Fagus orientalis, Acer platanoides, Castanea sativa, Ilex Aquifolium, Abies Borisi-regis, Ruscus hypoglossum.*

Very seldom, beech was found in close proximity to the ravines, in open places of the high parts of the relief, and then it always showed the taxonomic features of *Fagus silvatica*, both in respect to fruit and leaves. The absence of the male flowers unfortunately deprived me of the possibility of utilizing this characteristic feature.

General.

In order to determine what species of trees and shrubs are most characteristic of the closest association with *Fagus orientalis*, in Greece, I give here the synthetic list compiled from the lists of the five places visited by me, namely three on Mt. Ossa, one on Mt. Olympus, and one on Athos. The figures in brackets indicate the number of the occurrences of the respective species in all five lists.

Ilex Aquifolium (5), *Castanea sativa* (3), *Aesculus Hippocastanum* (3), *Fraxinus Ornus* (3), *Platanus orientalis* (2), *Taxus baccata* (2), *Acer Reginae-Amaliae* (2), *Abies spp.* (2), *Ruscus hypoglossum* (2), *Tilia cordata* (1), *Alnus glutinosa* (1), *Ficus carica* (1), *Daphne Laureola* (1), *Spartium junceum* (1), *Quercus Ilex* (1), *Acer intermedium* (1), *Acer platanoides* (1), *Juglans regia* (1), *Pinus nigra* (1),

Sorbus meridionalis (1), *Salix Caprea* (1), *Ostrya carpinifolia* (1), *Corylus Avellana* (1), *Lonicera Formanekiana* (1), *Hedera Helix* (1).

The most characteristic species in these localities are :—*Ilex Aquifolium, Taxus baccata, Platanus orientalis, Castanea sativa, Aesculus Hippocastanum, Acer Reginae-Amaliae.*

The first three of these are ancient species characteristic of damp woody associations of the Mediterranean and the Atlantic regions. *Juglans regia* is a very characteristic species in constant association with *Fagus orientalis* in some localities in the Balkan Peninsula, *e.g.*, Olympus, Rodopes (11), South Serbia, but is completely absent from the woods of Ossa and Athos Peninsula.

According to the observations made by Cernjavski, who has paid special attention to *Fagus orientalis* in Jugoslavia (on Mt. Belasica) (4), no sharp line can be drawn between the occurrences of *Fagus orientalis* and *F. silvatica.* Their morphological features give a gradual transition from one species to another, this phenomenom being in immediate relation to the external ecological circumstances (relief, micro-relief, abundance of light, dampness).

In the course of my excursions to Ossa, Athos, and Olympus I paid special attention to this fact and it was entirely confirmed by my observations.

When these varying and transitional taxonomic features, which can be easily explained by the ecological circumstances, are observed, one naturally begins to doubt whether they are not ecotypic features and whether they are really sufficient for drawing a distinction between *Fagus orientalis* and *F. silvatica.*

The great number of the transitional forms from *Fagus orientalis* to *F. silvatica* in the Balkan Peninsula, and the fact that the taxonomic features of the fruit-involucre do not always correspond to the characteristics of the leaves confirms my doubts as to the correctness of the modern systematic division of *Fagus.* Taking into consideration the results of our investigation, it is clear that great care is necessary in drawing conclusions as to the systematic position of the beech in Greece.

The author wishes to express his gratitude to Dr. Glishich, the Director of the Botanical Garden in Belgrade, who gave him kind permission to use the herbarium and the available literature, to P. Cernjavski, his assistant, for his great help in actually carrying out the work, and to T. Soshka, the Inspector of the Botanical Garden, for his help in the determination of herbarium material.

He also wishes to express his sincerest gratitude to Sir A. W. Hill, the Director of the Royal Botanic Gardens, Kew, for his kind assistance in arranging for the publication of this paper, and to Dr. W. B. Turrill for correcting the English.

Postscript. Mr. Grebenchikoff's paper is of considerable interest and importance. It was written in admirable English and only a relatively small number of corrections had to be made.

To the localities he gives for *Fagus orientalis* in Greece, others can be added from W. Thrace. H. G. Tedd has collected material, which must be placed under this species, or considered as more or less intermediate between it and *F. silvatica*, from Tchal Dagh (Mt. Zanthe), c. 700 m., No. 679 ; Kara Oghlan, 600 m., No. 721 ; and from near Ketcheli, c. 250 m., No. 1919.

W. B. TURRILL.

LITERATURE.

1. CZECZOTT, H. "Distribution of Fagus orientalis Lipsky." *Veröffentl. Geobot. Inst. Rübel in Zürich*, **8** (1932).

2. STOYANOFF, N. "Ueber d. Verbreitung der orient. Buche auf der Balkanhalbinsel." *Magyar Bot. Lapok*, **25** (1926).

3. MATTFELD, J. "Aus Wald u. Macchie in Griechenland." *Mitteil. d. Deutsch. Dendrolog. Gesellsch.* (1927).

4. CERNJAVSKI, P. "Das Vorkommen von Fagus orientalis Lipsky in Südserbien." *Bull. de l'Inst. Bot. de l'Univ. de Belgrade*, **1–2** (1931–1932).

5. WULFF, E. "The Beech in the Crimea." *Veröffentl. Geobot. Inst. Rübel in Zürich*, **8** (1932)

6. CZECZOTT, H. "A Study on the variability of the leaves of beeches : F. orientalis Lipsky, F. silvatica L. and intermediate forms." *Annales d. la Soc. dendrolog. de Pologne*, **5** (1933).

7. RÜBEL, E. "Zusammenfassende Schlossbetrachtung zur Vortragsrunde über die Buchenwälder Europas." Rübel, "Die Buchenwälder Europas." *Veröffentl. Geobot. Inst. Rübel in Zurich*, **8** (1932).

8. REGEL, C. "Die Vegetationsverhältnisse einiger Gebirge im östlichen Teile des Mittelmeergebietes." *Beiträge zur Systematik und Pflanzengeographie*, **10**, in *Fedde. Rep. Sp. Nov.* **71** (1933).

9. GREBENCHIKOFF, O. "Fagus orientalis Lipsky auf dem Thess. Olymp." *Zap. Russk. Nauchn. Inst. Belgrad.* **14** (1936).

10. WOLFF, E., PALIBIN, S. "Opredelitelj derevjev i kustarnikov, etc." (Bäume und Sträucher des eur. Russlands, Krim und Kaukasus). St. Petersburg (1904).

11. TURRILL, W. B. "The Plant-Life of the Balkan Peninsula." Oxford (1929).

VII—ON THE SYNONYMY AND DISTRIBUTION OF STRYCHNOS INNOCUA DEL.

A. A. BULLOCK AND E. A. BRUCE.

The investigation of the synonymy of *Strychnos innocua* Del. was commenced several years ago, when most of the Kew specimens were examined and annotated. For various reasons this work was suspended, but owing to a number of enquiries concerning the annotated specimens, it has been completed in the belief that the collected references will be of some value to herbarium workers and to forestry and agricultural officers.

The map shows a distribution which is now recognised as normal for a large number of African dry-country plants. The lengthy list of synonyms is due to the fact that earlier workers have regarded such an extensive distribution as impossible and have founded species on the mere fact of geographical separation.

It must be admitted that Gilg (1893) considered as varieties the numerous forms with which he was confronted, but Baker (1895 and 1903), working with different material, described species with differential characters which we have found to be inconstant and uncorrelated.

De Wildeman (1902-3), when describing his var. *obovata*, set out in tabular form the characters by which the various varieties are to be separated. We have studied each of these characters in turn and in association with one another, and have found that there is no correlation between them, and that each varies independently of the others. Gilg (1905) made some attempt to associate his varieties with the species described by Baker (1903), but this appears to be the last occasion on which any work on the synonymy of the plants concerned has been published. Later references quoted below are mainly to published lists, where specimens are referred to one or other of the described species.

Strychnos innocua *Del.* Cent. Pl. Afr. 53 (1826) ; DC. in DC. Prodr. **9,** 17 (1845) ; Schweinf. Pl. Nilot. 30, t. 10 (1862), et Beitr. Fl. Aethiop. 133 (1867) ; Dur. et Schinz, Étud. Fl. Congo, 195 (1896) ; Baker in Dyer, Fl. Trop. Afr. **4,** 1, 533 (1903) ; Broun, Cat. Sudan Fl. Pl. 49 (1906) ; Dur. et Dur. Syll. Fl. Cong. 372 (1909) ; Broun et Massey, Fl. Sudan, 241 (1929) ; Burtt Davy et Hoyle, Check List Trees and Shrubs, No. 2, Nyasaland, 48 (1936). Oberm. Schweick. et Verd. in Bothalia, **3,** 249 (1937).

S. innocua var. *pubescens* Solered. in Engl. Bot. Jahrb. **17,** 556 (1893).

Unguacha Simiarum Hochst. in Flora, **27,** 103 (1844), nom. nud. in obs., et Pl. Schimp. Exsicc. No. 1817.

S. Unguacha A. Rich. Voy. Abyss. Bot. Atlas, t. 73 (1847), et Tent. Fl. Abyss. **2,** 52 (1851) ; Walp. Ann. **3,** 72 (1852-53) ; Benth. in Journ. Linn. Soc. **1,** 80 (1857), in obs. et *l.c.* 103 ; Oliv. in Trans. Linn. Soc. **29,** 113 (1875) ; Gilg. in Engl. Bot. Jahrb. **17,** 562 (1893) ; Warb. in Engl. Pflanzenw. Ost-Afr. **B,** 225 (1895) ; Baker in Dyer, Fl. Trop. Afr. **4,** 1, 534 (1903).

S. Unguacha var. *dschurica* Gilg in Engl. Bot. Jahrb. **17,** 564 (1893).

S. Unguacha var. *dysophylla* (Benth.) Gilg, *l.c.* (1893), et in Engl. Pflanzenw. Ost-Afr. **C,** 310 (1895) ; Schinz* in Mem. Herb. Boiss. No. 10, 56 (1900).

S. Unguacha var. *grandifolia* Gilg in Engl. Bot. Jahrb. **17,** 564 (1893).

* The spelling " *Ungascha* " was used by Schinz for the specific epithet.

S. Unguacha var. *micrantha* Gilg, *l.c.* 563 (1893), et in Engl. Pflanzenw. Ost-Afr. **C,** 310 (1895).

S. Unguacha var. *microcarpa,* Gilg, *l.c.* 564 (1893) ; De Wild. Notes Fl. Katanga, **2,** 64 (1913), et *l.c.* **6,** 60 (1921), et Étud. Fl. Katanga, **2,** 121 (1913).

S. Unguacha var. *Steudneri* Gilg, *l.c.* 563 (1893), et in Engl. Pflanzenw. Ost-Afr. **C,** 310 (1895).

S. Unguacha var. *polyantha* Gilg in Engl. Bot. Jahrb. **30,** 374 (1901) ; De Wild. Étud. Fl. Katanga, **2,** 121 (1913), et Notes Fl. Katanga, **2,** 64 (1913), et *l.c.* **6,** 60 (1921), et Contrib. Fl. Katanga, 149 (1921), et *l.c.* Suppl. 1, 69 (1927).

S. Unguacha var. *obovata* De Wild. Étud. Fl. Katanga, **1,** 98, t. 27, f. 6–7 (1902–3), et *l.c.* **2,** 121 (1913), et Contrib. Fl. Katanga, 149 (1921) ; Dur. et. Dur. Syll. Fl. Cong. 373 (1909).

S. Unguacha var. *retusa* Chiov. Fl. Somala, **2,** 305 (1932).

S. Lokua A. Rich. Tent. Fl. Abyss. **2,** 52 (1851) ; Walp. Ann. **3,** 72 (1852–53) ; Benth. in Journ. Linn. Soc. **1,** 103 (1857) ; Schweinf. Beitr. Fl. Aethiop. 134 (1867).

S. dysophylla Benth. in Journ. Linn. Soc. **1,** 103 (1857) ; Baker in Dyer, Fl. Trop. Afr. **4,** 1, 533 (1903) ; Prain et Cummins in Dyer, Fl. Cap. **4,** 1, 1054 (1909) ; Bews, Fl. Natal and Zululand, 159 (1921) ; Henkel, Woody Pl. Natal and Zululand, 161 (1934) ; Bremek. et Oberm. in Ann. Transv. Mus. **16,** 428 (1935) ; Burtt Davy et Hoyle, Check List Trees and Shrubs, No. 2, Nyasaland, 48 (1936).

S. randiiformis Baill. in Bull. Soc. Linn, Paris, **1,** 246 (1880).

S. Quaqua Gilg in Engl. Bot. Jahrb. **17,** 567 (1893), et in Engl. Pflanzenw. Ost-Afr. **C,** 310 (1895) ; Busse, Gilg. et Pilger in Engl. Bot. Jahrb. **32,** 176 (1902) ; Baker in Dyer, Fl. Trop. Afr. **4,** 1, 531 (1903) ; Gilg in Engl. Bot. Jahrb. **36,** 93 (1905) ; S. Moore in Journ. Linn. Soc. **40,** 148 (1911) ; Burtt Davy et Hoyle, Check List Trees and Shrubs, No. 2, Nyasaland, 48 (1936).

S. alnifolia Baker in Kew Bull. 1895, 150, et in Dyer, Fl. Trop. Afr. **4,** 1, 532 (1903) ; Gilg in Engl. Bot. Jahrb. **36,** 93 (1905).

S. Burtoni Baker, *l.c.* 98, et *l.c.* 533 ; Dawe, Rep. Bot. Miss. Uganda, 51 (1906) ; Eyles in Trans. Roy. Soc. S. Afr. **5,** 441 (1916) ; R. E. Fries, Wiss. Ergebn. Schwed. Rhod.-Kongo Exped. **1,** 259 (1916).

S. triclisioides Baker, *ll. cc.* ; Lely, Useful Trees N. Nigeria, 106, (1925), cum fig. ; Hutch. et J.M. Dalz. Fl. W. Trop. Afr. **2,** 22 (1931) ; Aubréville, Fl. For. Côte d'Ivoire, **3,** 153 (1936) ; J. M. Dalz. Useful Pl. W. Trop. Afr. 364 (1937).

S. xerophila Baker, *l.c.* 98, et *l.c.* 534 ; Broun, Cat. Sudan Fl. Pl. 49 (1906) ; A. Chev. Miss. Chari-Lac Chad, 1902–4, **1,** 204 (1913) ; Broun et Massey, Fl. Sudan, 242 (1929).

S. Behrensiana Gilg et Busse in Engl. Bot. Jahrb. **32,** 175 (1902) ; Baker in Dyer, Fl. Trop. Afr. **4,** 1, 531 (1903).

Map illustrating the distribution of *Strychnos innocua* Del. in Tropical Africa. Ringed crosses indicate that the exact locality was not given by the collector.

S. penduliflora Baker, *l.c.*; Gilg in Engl. Bot. Jahrb. **36,** 92 (1905); Broun, Cat, Sudan Fl. Pl. 49 (1906); Broun et Massey, Fl. Sudan, 241 (1929).

S. spinosa Fiori, Bosch. Pl. Legn. Eritrea, 303 (1909–12), quoad syn. (et nom. vern.), non Lam. (1793).

S. dshurica Gilg. ex A. Chev. Miss. Chari-Lac Chad, 1902–4, **1,** 203 (1913), et Expl. Bot. Afr. Occ. Franç. **1,** 443 (1920).

French Guinea. Without locality (sterile), *Pobeguin* 860, " medium-sized tree, flowers green, small, fruit size of orange with a hard pericarp, edible but acts as an emetic if eaten in large quantity."

Gold Coast. Passankwia to Bugiyenga, May 1927 (fl.), *Kitson* 664; Santejan to Nebiowalli (?), May 1927 (fl.) *Kitson* 775; (locality ?, *Kitson* 834;) Gwanbele to Bantala, April 1927 (sterile), Kitson 909.

Nigeria. Nupe, on hill-sides (fl., young fr.), *Barter* 1160 (type of *S. triclisioides*), " shrub 8–14 ft., fl. yellow, seeds poisonous." Lukuja, Niger confluence (sterile), *Dalton s.n.* Sokoto, 450 m., May 1923 (fl.), *Lely* 836, " a small tree 20 ft. high, with yellow flowers and round yellow fruits 2 in. in diameter, seeds in sweet pulp—' Kokiya '." Katagum, (fl.), *Dalziel* 421, " shrub or small tree,—' Namijin kokia '." Yola, April 1909 (fl.), *Dalziel* 197, " fruit yellow, not edible, and smaller than the edible Kokia (*S. spinosa* Lam.),—' Namijin kokia '." Without locality, June 1909 (sterile), *Shaw* 45, " tree 15 ft." Bauchi Plateau, savannah, Febr. 1929 (fl.), *Lely* P.155, " small tree, yellowish flowers, spherical green fruits some 2 in. diam." Interior of western Lagos (fl.), *Rowland* s.n. (syntype of *S. alnifolia*).

French Sudan. Without locality, March 1899 (fl.) *Chevalier* 623.

Chad Territory. Pays de Saras, June 1903 (fl.), *Chevalier* 8591.

Cameroons. Bosum, Kojali, savannah, March 1914 (fl.), *Tessmann* 2262, "—' Kobodaua ' "; *ibid.*, May 1914 (fl.), *Tessmann* 2439. East of Babua, about 1000 m. (5° 50'N., 14° 50'E.), May 1914 (sterile), *Mildbraed* 9271a.

Oubangui-Chari. Dar Banda, Jan. 1903 (fl.), *Chevalier* 7235.

Sudan. Djur-land (=Bongo-land): Seriba (Kutschuk Ali), May 1869 (fl.), *Schweinfurth* 1719 (syntype number of *S. Unguacha* var. *grandifolia* and of *S. xerophila*); Wau, May 1869 (fl.), *Schweinfurth* 1672 (type of *S. penduliflora*); Pongo River, between Wau and Dein Zeebeir, on stony ground, March 1902 (sterile), *Broun* 362, " flowers green, tube long,—' Hogel Fil' "; Djur River, south of Wau, on iron-stone rocks, [Akwallakalla–Djur; Amonlenya–Zonde; Busseri–Wau; Tambura Road–Shambe Yirrol Road], April 1931 (fl., fr.), *Turner* 26, " small tree, fruit size and shape of orange "; Gir, April 1869 (fl.), *Schweinfurth* 1412 (syntype number of *S. Unguacha* var. *Steudneri*); Seriba Ghattas, near Addai, April 1869 (young fr.), *Schweinfurth* 1432 (type number of *S. Unguacha* var. microcarpa); Bahr el Ghazal,

March 1902 (sterile), *Broun* s.n.; Duniaka, top of ironstone hill [Imawerangi–Zande; Gorogoro–Bongo], fairly common, April 1931 (fl.), *Turner* 17, " small tree, bark smooth, glaucous-gray, fruit globular, eaten by monkeys." Blue Nile: Jebel Fazoghli, Nov. 1900, *Muriel* L/38, " shrub, roots said to be applied burning to snakebite, ' Erg et Saggat '; " Gallabat, Matamma, June 1865 (sterile), *Schweinfurth* 1660 (syntype number of *S. Unguacha* var. *grandifolia*); Gallabat, June 1931 (fl.), *Cooke* 45, " medium-sized tree up to 30 ft. high, light gray bark, small flowers in dense clusters, buds yellow, opening white, leaves deeply veined, usually, but not always, in whorls of three; " *ibid.*, June 1931 (fr.), *Cooke* 62, " tree up to 25 ft. high, smooth gray bark, fruit very hard, size of a small orange, said to be edible,—' Kudkudda '; " Southern Kordofan, Rohr el Afin, near Kadugli, Dec. 1907, *Broun* 1347, " fruit 1½ in. diam."

Abyssinia. " Arbor in demissis versus fluvium Tacaze prope Djeladjeranne," April 1841 (fl.), *Schimper* 1817 (type number of *Unguacha Simiarum*).

Uganda. West Nile: without exact locality, July 1863 (sterile), *Speke and Grant* s.n. (syntype of *S. xerophila*), " fruit the size of an orange, pulp yellow, sweetish, edible; " Mt. Ito, Terego country, 1470 m., Febr. 1934 (fl.), *Eggeling* 1515 [U.F.D.* 1445], " common bush up to 15 ft. high, flowers whitish green, fruits green, smaller than a tennis ball "; Amua, (fl., fr.), *Eggeling* 904 [U.F.D. 1252], " tree 20 ft. high, flowers light green with white hairs in the throat, fruit blue-green, said to be eaten by monkeys,—' Lumboro ' (Madi) ". Unyoro: Chiope and Acholi country (fl.), *Dawe* 830, " tree 6–15 ft. said to yield a large edible fruit ". Mubende: near Bukomero, Singo, on rocky hillsides (young fr.), *Eggeling* 483 [U.F.D. 819], " small scrubby tree up to 20 ft. high, fruit spherical, just over 1 in. diam., green ". Lango: near Lira, 1050 m., Jan. 1931 (fl., fr.), *Hill* 13, " large tree, flowers greenish-yellow, fruits globose, green, about the size of an orange." Teso: Serere, on rocky hills (fr.), *Eggeling* 753 [U.F.D. 1150], " small tree up to 20 ft. high, fruit woody, green, the size of a tennis-ball "; *ibid.*, 1080 m., Dec. 1931 (fr.), *Chandler* 343, " tree 20–25 ft. high, orange-coloured fruit the size of a large orange, flowers small, light in colour, tinted pale pink." Busoga: without exact locality, 1050 m. (fr.), *Snowden* 216, " a small tree, round fruit, large seeds,—' Muonda '."

Tanganyika Territory. Shinyanga: without exact locality, 1200 m., on savannah hills, June 1931 (sterile), B. D. Burtt 3301, " shrub up to 12 ft. high." Tabora: without exact locality, Dec. 1926 (sterile), *Wallace* 13, " tree with large round fruit,—' Mtonga ', ' Mkukuru ', ' Mkrukuru '." Singida: Muwera, 1260 m., in *Berlinia* savannah, March 1928 (sterile), *B. D. Burtt* 1387, " a

* Uganda Forestry Department. All the specimens received at Kew from this department bear two numbers, and both are cited here to avoid confusion, as at least some of the distributed duplicates bear only one of them.

common dark-green-leaved shrub, 12 ft. high,—' Mpundu '." Kondoa Irangi : Kolo, Dec. 1925 (sterile), *B. D. Burtt* 312. Dodoma : Mpwapwa, 1050 m., in red-clay soil in *Vitex* formation, Dec. 1931 (fl.), *Hornby* 428, " tree 20 ft. high " ; Kilosa, on *Brachystegia* hillsides, Jan. 1926 (sterile), *B. D. Burtt* 88. Unyiha : Mbozi, in dry forest, Oct. 1932 (young fl.), *Jessel* 60. Rungwe : Bulambya (Kyimbila Distr.), Dec. 1912 (fl.), *Stolz* 1735.

Nyasaland. Ntondwe (=Ntonda ?), 1905 (fl.), *Cameron* 168. Shire Highlands (fl.), *Buchanan* 478. Shire Valley (young fl.), *Waller ex Kirk* s.n. (type of *S. Burtoni*), " ' Inteme ' ". Without locality (sterile), *Buchanan* 93.

Portuguese E. Africa. Quilimane (sterile), *Stuhlmann* 1041 (type of *S. Quaqua*, in Berlin herb., photo. in Kew herb.), "—' Mquaqua ' ". Shupanga, Jan. 1863 (young fl.), *Kirk* 368, " pulp of the fruit orange-coloured ; dried, beaten up and eaten,—' Intheme '." Kongone, Jan. 1861 (sterile), *Kirk* s.n. " pulp of fruit good, like strawberry,—' Mtheme ', ' Ntemo '." *ibid.*, Nov. 1859 (young fl.), *Kirk* s.n., " shrub 12 ft. high, on sandy soil." Chibabava, Lower Buzi River, in the Madanda Forest, 120 m., Dec. 1906 (sterile), *Swynnerton* 1076, 1077, 1078, " a somewhat large tree with large yellow hard-shelled edible fruits, the pulp of which is used by natives as food,—' Mukwakwa '." Chirinda (fl.), *Swynnerton* 1959, " a large tree with edible fruits,—' Mukwakwa '." Chibuli (fl.), *Honey* 753, " fruit yellow when ripe, globose, 4 in. diam. or more, full of edible pulp in which the seeds are embedded, acid in flavour,—'M'Quaqua ', ' Puffin Orange '." Delagoa Bay (fl.), *Forbes* s.n.

Belgian Congo. Katanga, Oct. 1916 (fl., fr.), *Ringoet* 99, " small tree, fruit edible,—' Kakomekome '."

Northern Rhodesia. South of Chiengi, on gneiss outcrops, June 1933 (fr.), *Michelmore* 382, " fruit edible, ripens and browns in September,—' Mulungi '." Mufulira, in open forest, May 1934 (fr.), *Eyles* 8202, " slender tree, unarmed, 15–20 ft., fruit blue." Between Nyabisonga and Mumbezhi Rivers, Solwezi District, near a stream on the edge of *Brachystegia* woodland, July 1930 (fr.), *Milne-Redhead* 792, " small tree, 10 ft., fruit sea-green, unripe, 3 in. diam. ; leaves larger than those of other species seen—' Munkolokolo ' (Chikaonde)."

Southern Rhodesia. Lomagundi, 1200 m., July 1926 (sterile), *Herb. Dept. Agr. S. Rhodesia* 1200 ; *ibid.*, May 1926 (sterile), *Herb. Dep. Agr. S. Rhodesia* 1243, " fruit round, smooth, hard, blue, not eaten."

Angola. Malange : (fl.) *Gossweiler* 1121 ; *ibid.* (sterile), *Gossweiler* 1123.

South Africa. Transvaal : west of Blueberg and Hangklip Mts., south of the Limpopo River, Nov. 1871 (sterile), *Baines* s.n., " bush with sweet, well-tasted black berry " ; Potgietersrust, Magouta River gorge, on the Zebediella Estate, Dec. 1931 (fl.),

Galpin 11624, " shrub 10 ft ; " Zoutpansberg, occasional on the north slopes, Nov. 1932, *Obermeijer, Schweickerdt and Verdoorn* 161 (Nat. Herb. Pretoria). Natal : Tugela, *Gerrard* 1660, " a low tree."

The distribution apparently covers the whole of the savannah—dry deciduous forest country from French Guinea westwards through the Sudan to Abyssinia, southwards through Uganda and Tanganyika to Nyasaland, Portuguese East Africa, Transvaal and Natal, and westward through the Rhodesias and southern Belgian Congo to Angola. There are important gaps in the known distribution, but these include only areas in which botanical exploration has not been seriously undertaken, and it may be assumed that the plant has a continuous distribution through the areas mentioned.

The only similar area which has been extensively explored and where *Strychnos innocua* has not been collected is western Kenya Colony. It may be absent or very rare in that area on account of the higher altitude of the grasslands and deciduous forest.

VIII—MISCELLANEOUS NOTES.

New Year Honours.—We record with pleasure the following Honours : C.I.E., Mr. C. F. Bell, Chief Conservator of Forests, Central Provinces and Berar ; C.M.G., Dr. J. D. Tothill, Director of Agriculture, Uganda Protectorate ; M.B.E., Mr. John Coutts, lately Curator, Royal Botanic Gardens, Kew.

The New York Botanical Garden.—We learn with interest that Dr. William J. Robbins, Professor of Botany, Chairman of the Department of Botany, and Dean of the Graduate School of the University of Missouri, has been appointed Director of the New York Botanical Garden. Dr. Robbins has been Professor at Missouri since 1919 and he became Dean of the Graduate School of the University in 1930. After obtaining his Ph.D. at Cornell in 1915 he taught plant physiology there, and it is in this branch of botany that he has made his mark. Lehigh University conferred upon him last year the honorary degree of doctor of science. Perhaps his best known published work is that written in collaboration with H. W. Rickett : " Botany, a Text-book for College and University Students," 1929. A second edition appeared in 1934.

Printed under the authority of His Majesty's Stationery Office
By the South Essex Recorders, Ltd., High Road, Ilford.

(2387) Wt. 16/32 800 2/38 S.E.R. Ltd. Gp. 381